

MODEL AIRPLANE NEWS

10th Year of Publication

APRIL, 1939

20c



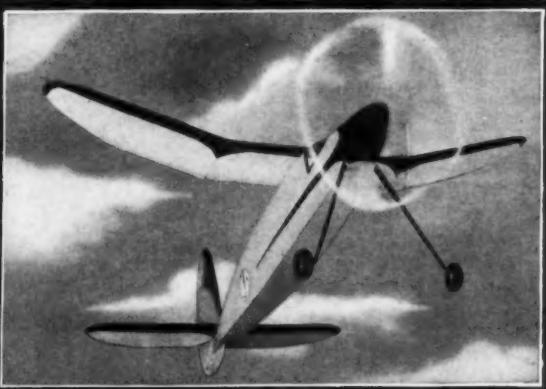
The Curtiss-Wright CW-21
Interceptor Fighter

(See Page 10)

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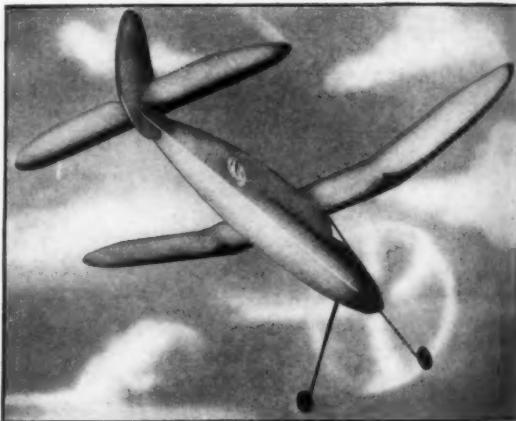
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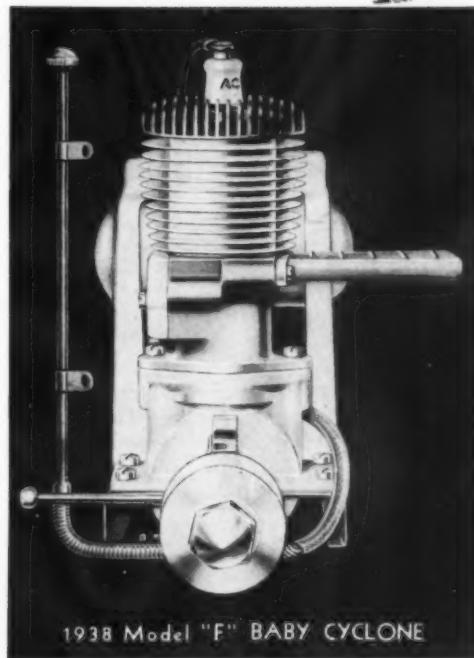
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Model AIRPLANE News

10th YEAR OF PUBLICATION

VOL. XX

No. 4

Edited by Charles Hampson Grant

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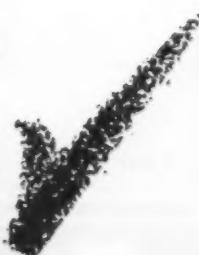
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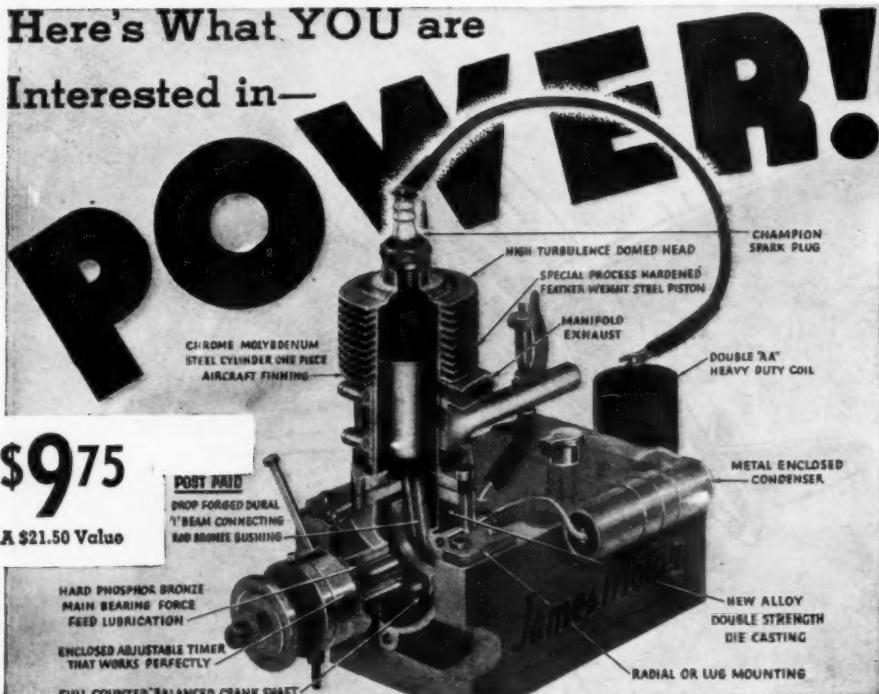
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13" PROP. ACTUAL VALUE
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The Gas Model Aeroplane Association of Southern California, Inc. held their Semi-Annual Meet December 11, 1938. There were over five thousand people present and over four hundred and fifty entries. The Douglas Aircraft Company offered a Silver Trophy for the Low-Wing Event.

Model builders competing were experts and they all wanted to win that cup.

Now this Low-Wing job is a very difficult plane to build. It was copied after the Government fighting planes. It had a five foot wing-spread and was very fast and had to have a lot of power to get altitude. These planes weighed in at four pounds fourteen ounces each, with a one ounce leeway. THE LOW-WING SHIP powered with the JAMES MOTOR won this event!



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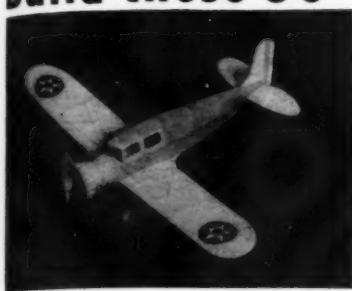


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Wing spread 35". Overall Length 23½". Weight 2 oz.

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Wing spread 36". Overall length 24½". Weight 2 oz. These kits meet the demand for inexpensive rubber-powered flying models that look sound and fly like real gas jobs.

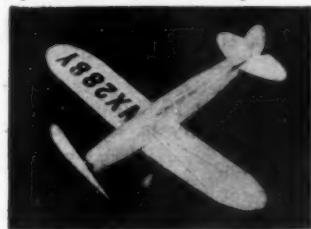
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Overall Length 37½". Weight 3 oz.

The superior quality and correct aerodynamic design of this model makes it one of the outstanding buys of the season. A dandy flyer!

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- No. 86 MERCURY JR.

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"You'll get a thrill if you catch a thermal!"



K-48 MONOPLANE

48" wing spread—33½" length

This is a monoplane kite that will outfit any model you have ever seen in the air. It's something new that is bound to win popular favor.

Retail 50c mailing charge
20c extra

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"You'll get a thrill if you catch a thermal!"



K-48 BIPLANE

48" wing spread—33½" length

A big brother to the K-48 monoplane this biplane looks like the real thing! We guarantee that after flying one, you will agree that it has no peer in the air.

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BOYS! Look at These 3 Star Hits!
3 of each or 3 assorted
FOR 45c, POSTPAID, U.S.A.



ARMY PURSUIT

An all Balsa Flying Model Construction Set, colorfully styled with wing, body and rudder printed in red and blue.

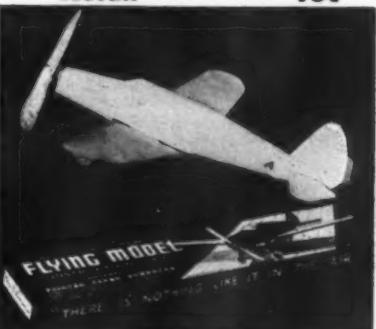
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An all Balsa ready-to-fly glider with the profile of a real military plane. Wings, body and elevator printed in red and blue.

Retail at your dealers **10c**



AERONEER

Our newly patented construction set that makes it possible to construct a good flying model in about 1/2 the usual time.

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Hermetically sealed to prevent evaporation and crystallization!

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PAUL K. GUILLOW

WAKEFIELD, MASS.



Uncle Sam's newest and fastest pursuit plane, the Lockheed XP-38, in which Lieut. Ben S. Kelsey spanned the continent

THEY SAID "THE PURSUIT"

By DOUGLAS J. INGELS and RICHARD A. ASZLING

EARLY last month one of the army's crack test pilots, Lieut. Ben S. Kelsey, took off for the west coast from Wright Field to inspect a Lockheed plane which he was to fly back to Dayton for acceptance-testing by the army. What type ship it was, no one knew, for the aircraft plant at Burbank had shrouded its construction in absolute secrecy. Not until it was ready to be taken back to the Materiel Division did it appear in public.

How fast could it fly? How high? What maneuverability? These questions and others were inevitable in the minds of that group of men who clustered around the XP-38, now the U.S. Army's fastest pursuit plane, when she was rolled out of her secret hangar for the first time. Modest young Lieut. Kelsey provided the answer to these questions when he hurtled

this new distinctive plane over the mountains from March Field, Riverside, Calif., across the country to land at Mitchel Field 7 hours, 48 minutes later. News of this flight came as a sudden "bolt from the blue," for no layman had suspected that Uncle Sam, in conjunction with Lockheed, was busily producing such a phenomenal plane. The creation of this plane sprang from the necessity of producing a pursuit ship that could catch the fast modern bombers. This has been one of the chief problems concerning the army air corps officials since the advent of the "Flying Fortresses" and other high speed planes of this type. Up to this time bombers have been "making monkeys" out

of the smaller, single place jobs; and pursuit ship builders were becoming desperate in their attempts to fashion

a creation that could successfully combat these immense planes, carrying tons of demoralizing explosives.

Lockheed is one of the most progressive plane producers in this country. They have built fast transports for the army but have never produced fighting aircraft. Nevertheless they appreciated the problem with which the army air corps was confronted, and set all their energies toward the creation of a super-pursuit plane. The flight which the XP-38 has just completed tells far more vividly than words how successful they have been in this project. The plane has proved itself to be the trimmest, fastest and sauciest military plane the world has ever seen. It is a twin engine, single place pursuit ship with a number of radical design changes that promise to make it one of the most formidable war planes in aviation history. This plane had been under-



Lieut. Kelsey climbs from the cockpit at Dayton, O. after averaging 375 m.p.h. on his flight from California at 60% throttle.



Chief of the Air Corps, Maj. Gen. Arnold, left, discusses the performance of the new plane with Wright Field Chief Brgr. Gen. Robins and Lieut. Kelsey.



Preparing the three-legged speed demon for its record crashing flight on which it made a speed of 400 m.p.h.

WAS DEAD !!

Intimate Glimpses of the Pursuit Plane That Has Cracked the Bomber's Supremacy of the Skies

going tests at the Lockheed plant for a number of weeks. However, officials felt that the final and supreme test for such a ship would be a coast to coast flight. So this new "air charger" was groomed for the hop.

Mechanics stood on the ramp at the Amarillo, Tex., airport early that crisp February morning and watched a silvery streak materialize out of the west. That "streak" was the XP-38, with Ben Kelsey at the controls, completing the first leg of what was to be a startling, record-smashing dash across the continent. He had hurtled the new ship over the mountains from March Field, Riverside, Calif., in slightly more than three hours.

Twenty minutes later, having refueled and checked weather conditions ahead, the young officer roared eastward toward Wright Field. In less than three hours he was in Dayton, the second leg of his continent-spanning hop behind him. He had covered the 1900 miles from March Field in just five hours and 43 minutes.

On the flying line at Wright Field stood Maj. Gen. Henry H. Arnold, chief of the U.S. Army Air Corps, and Col. A. W.

Robins, acting chief of the Materiel Division and new Randolph Field Commandant. Gen. Arnold had left Wichita, Kan., in a bomber two hours after Kelsey left the west coast, but landed in Dayton only twenty minutes ahead of the young test pilot.

Refueling and checking operations completed, the lieutenant received good wishes and godspeed from his superior officers and once again lifted the sleek, new ship into the air. Mitchel Field, Long Island, was his final goal.

Disaster at the end of the trip marred an otherwise perfect flight log, but it did not detract from the achievement of the revolutionary new plane and its skilled pilot. For in negotiating a landing at Mitchel, after dashing from coast to coast in seven hours and two minutes' flying time, Lieut. Kelsey nicked a tree top and brought the XP-38 down in an adjacent golf course, ripping off the right wing,

damaging the fuselage, and shearing off the undercarriage and propellers. Luckily he closed the ignition before the plane could catch fire and then climbed from the cockpit unhurt except for minor lacerations.

His elapsed time in the flight from coast to coast was seven hours and 48 minutes, or just twenty minutes more than the record set by Howard Hughes on his non-stop dash in 1937. But Kelsey was on the ground at Amarillo and Dayton twice as long as the difference between his time and Hughes'. Thus his actual time in the air, according to the computation of the National Aeronautical Association, became a new cross-country record.

Important because of the new transcontinental record it set, Lieut. Kelsey's flight was considered far more significant in high army circles for other reasons. Officers were more interested in the fact that it proved the worth of the XP-38's new design features.

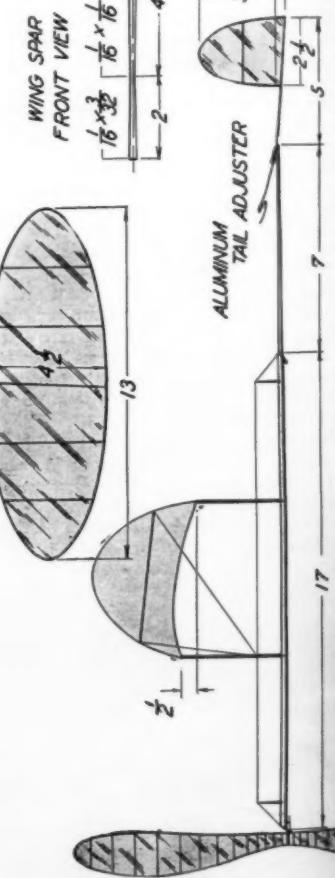
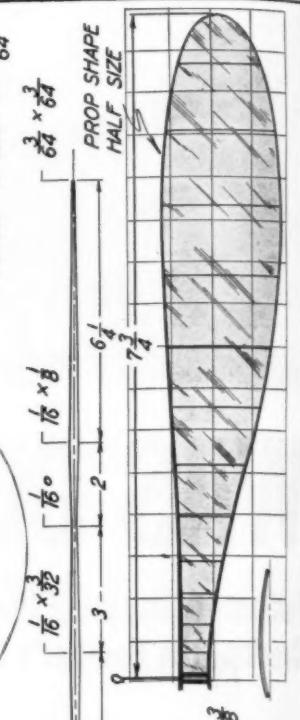
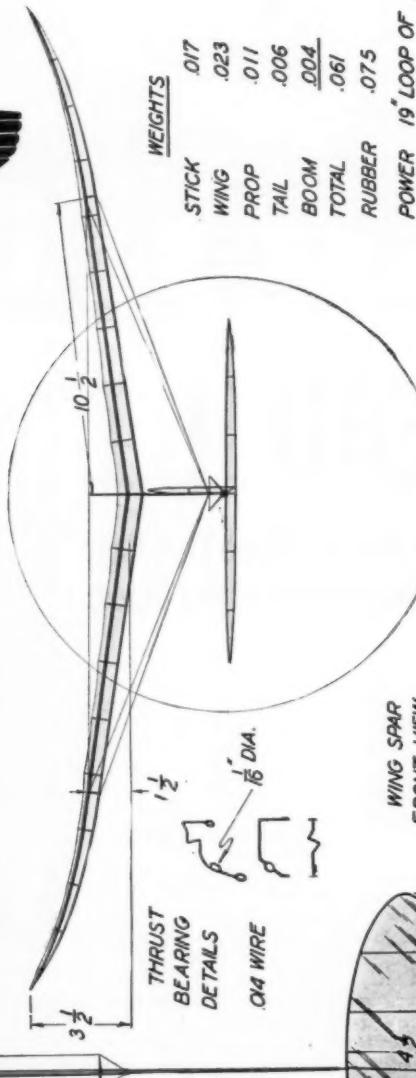
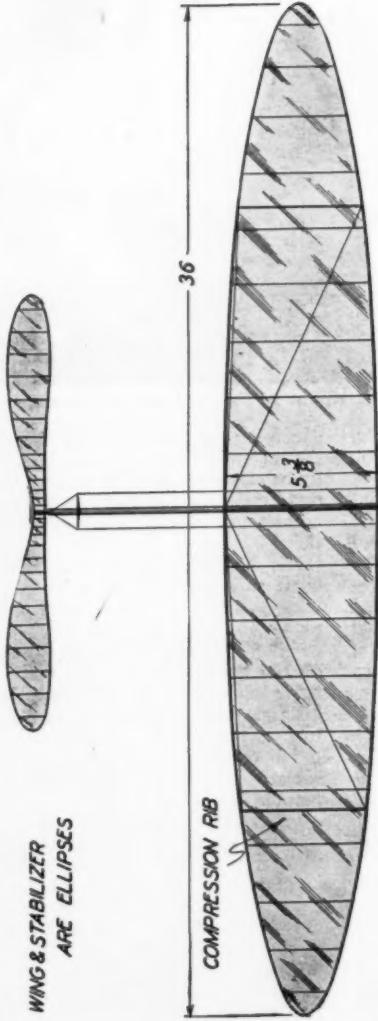
Chief among them are its twin power plants, thousand-horsepower Allison inline engines which permit a far higher degree of streamlining than the stubby



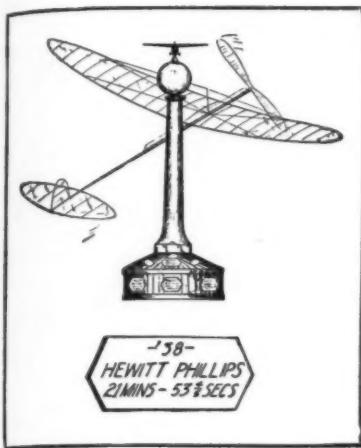
Lieut. Kelsey as he "stepped out" at Dayton, Ohio



Here the power and sleek lines of the XP-38 are evident. (Acme)



M.G. Zepke



THE STOUT INDOOR TROPHY WINNER

How You Can Build the Stick Model That Captured the Stout Indoor Trophy at the 1938 National Contest, Detroit, Mich.

By HEWITT PHILLIPS

paper thinness, 8 inches long 5/8 inch wide at one end tapering to 3/8 inch wide at the other. A tapered form to wrap it on may be made by winding a triangular piece of writing paper around an end of a 1/16-inch metal rod.

The center rib of the stabilizer, which forms a continuation of the tail boom, is also hollow. The blank used for this rib is 5 inches long and tapers from 3/8 inch to 3/16 inch wide. The two sections of the boom are joined by a 3/8-inch length of 1/32-inch diameter aluminum wire to provide for adjustment of the rudder and stab. Spars in the tail assembly are sanded round taper from 1/16 inch diameter in the center to 1/32 inch at the tips. Ribs in the tail surfaces are approximately 1/64 inch square in cross section. No camber is used in the stabilizer.

Next the wire fittings are glued on and finally the tungsten wire. The tension in the wire should be sufficient to bow the stick 3/16 inch. This results in a motor stick which weighs .017 ounces and which will take the pull of a loop of 7/64-inch rubber weighing five times as much.

Construction of the tail assembly is quite conventional. Tail boom is made from a piece of quarter-grained balsa sanded to

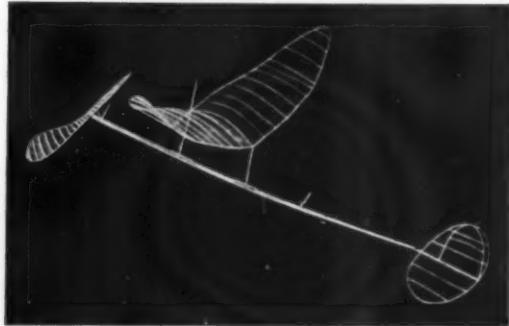
cause of the use of tungsten bracing.

Instead of tapering evenly from a maximum cross section at the center to a minimum at the tips, as is done in cantilever wings, the wing spars have a cross section which varies in the following manner: The spars are 1/16 inch by 3/32 inch at the center, tapering to 1/16 inch in diameter by 2 inches out

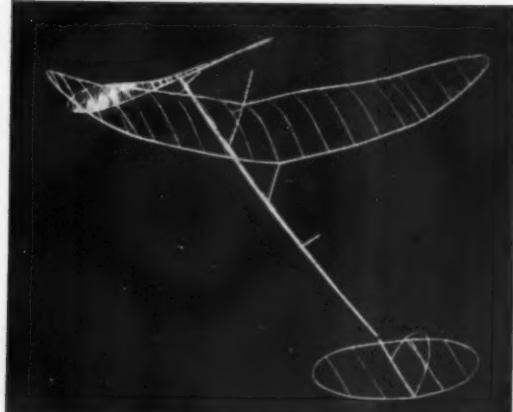
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The completed super-light winner



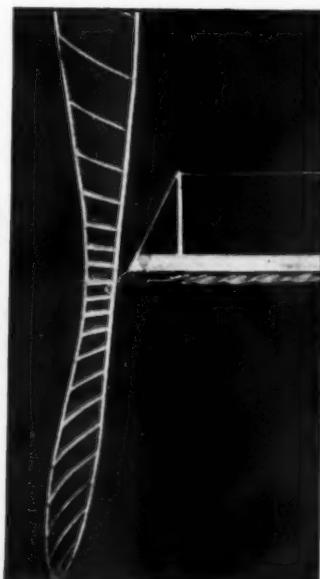
Note the braced motor stick and wing



Even the "prop" is microfilm-covered

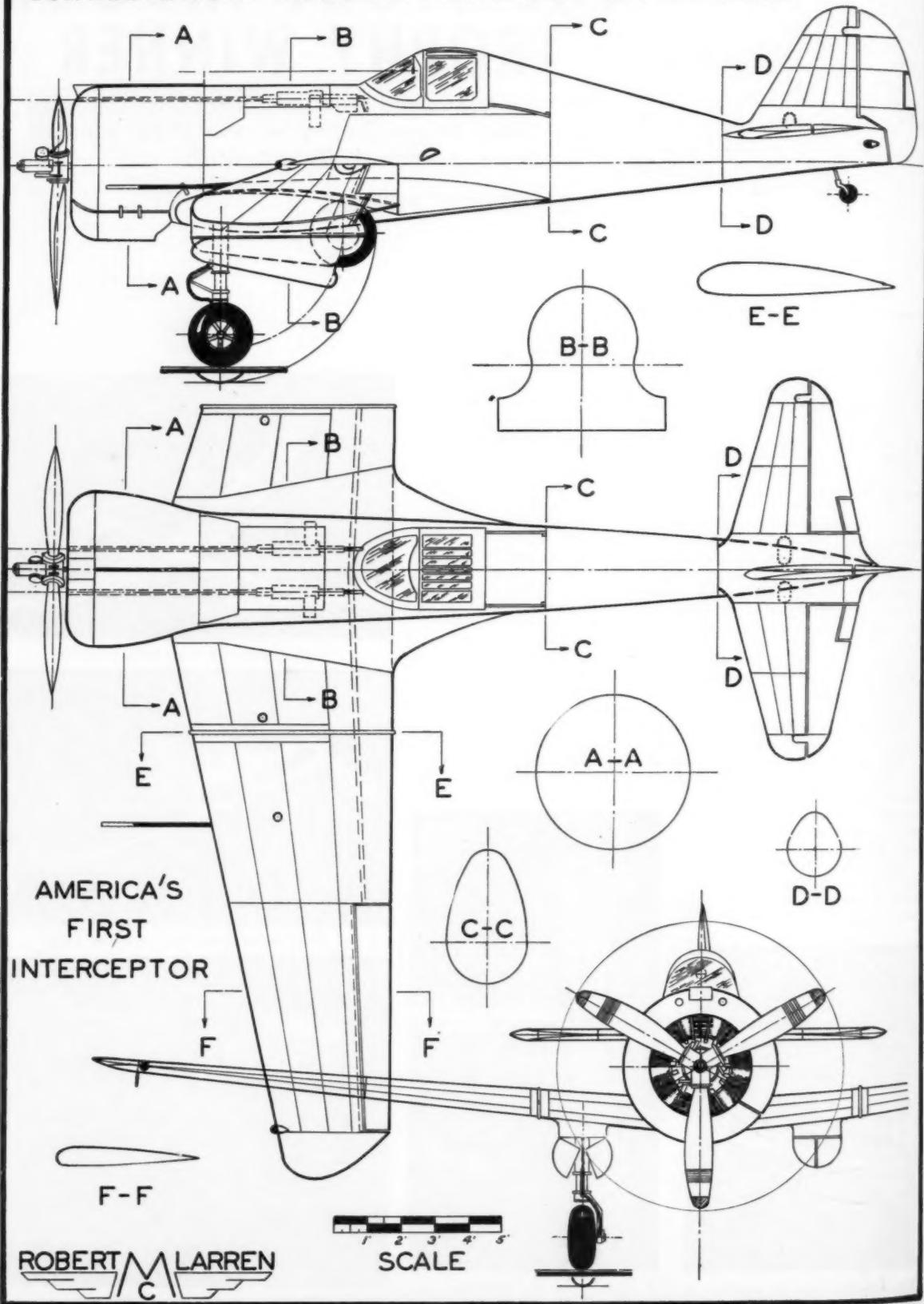


The stabilizer and fin structure is super-light



A close-up of the propeller and front motor stick brace boom

CURTISS-WRIGHT MODEL 21 INTERCEPTOR - FIGHTER



A MOTOR WITH WINGS

The Plane on the Cover

By ROBERT McLAREN

AMERICA'S only fear of attack, that of a sudden, unannounced assault by enemy air raiders, has at last been met by the completion of her first "Interceptor" type fighting plane, the Curtiss-Wright CW-21. From China and Spain we have learned that enemy bombing squadrons arrive unheralded, unheralded, and very much unwelcomed. In many raids in both wars the enemy bombers have never even been heard, much less seen, and their presence was only made known by the ghastly eruptions of the lethal capsules as they ended their mission buried deep in the city's ghoulily raked streets.

At best the enemy's ominous nearness has been suspected far too late to dispatch armed aerial defence. Anti-aircraft guns, poor weapons for retaliation against high-flying sky marauders, have been resorted to in final desperation. England solved her strategic military problem long ago with the design of interceptor-type warcraft, fast, light, high-climbing pursuit ships capable of ascending heavenwards at an astounding speed. London will forever remain the most vulnerable city in the world due to her proximity to open water and the complete absence of observer-laden miles between her and the approaching enemy from the East. News of an impend-

ing air attack can only come to her after the first deadly bomb has exploded in her vitals. Her salvation rests in her interceptor squadrons.

In America we have the world's largest and richest city situated under very much the same circumstances: New York City. Our west coast contains two other such industrial centers. But these cities need no longer remain unprotected from sudden aerial death. Only the threat of foreign upheaval in the present international crisis has forced Uncle Sam to reveal a ship he has jealously guarded throughout its three years of development, an American interceptor which far surpasses anything of a like design the world has to offer. It is the fastest-climbing, hardest-hitting fighter on earth: Curtiss-

(Continued on page 42)



The Army's first interceptor, the Curtiss Wright CW-21



Two views of this remarkable plane that will help to explain its high performance

THIS month's question for those-in-the-know: Anybody can construct a model, but not everybody is able to . . . well.

(Fill in the correct words, answer is somewhere below.)

DO YOU remember when . . . You know, when you began building and flying model airplanes? . . . a one-minute flight was something to boast about, wasn't it? . . . and now your burning ambition is to make the Wakefield team . . . but how about those new club members—they'd like to build and fly better models.

Who's to help them? Why, you!

Back in your novice days recall how much you appreciated a little assistance from the "experts" . . . here's where you repay that helping hand by coming to the aid of the youngsters. In all this: realize that the younger enthusiasts are usually overly-anxious and less able to do things as well as you . . . so be patient . . . and don't criticize, instead—guide their steps towards improvement . . . About the best

suggestions that can be offered concern the types of models the beginner should undertake—such models should be easy to build, as fool-proof as possible and especially sturdy . . . large enough to adjust easily and small enough to be economical . . . and well-designed, for a poorly-proportioned model will be unstable before it leaves the work bench—so steer 'em clear of those.

After the beginner completes his ship the few necessary adjustments should be explained to him . . . these include lining up the elevator, rudder and wing . . . balancing the plane until obtaining a proper glider, "wash-in" (giving one wing more lift by bending down the trailing edge, bending up the leading edge) and "wash-out" (giving one wing less lift by doing just the opposite of "wash-in") to correct propeller torque, use of "down-thrust" if

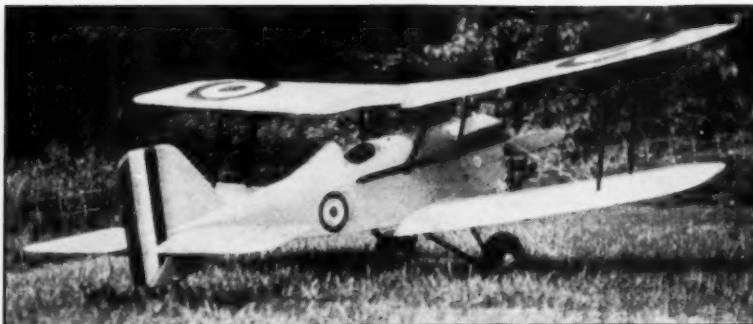
A WORD TO THE WISE A Helping Hand—Extended By

The "INSTRUCTOR"

model stalls under power when adjusted to glide evenly. Then take a few moments to demonstrate the varying flight performances that result when the "wing setting" is changed . . . this wing setting is also termed the angle of incidence, or sometimes, and aptly so by the beginners, the angle of innocence.

The majority of youngsters beginning to build and fly model planes make the mistake of under-powering their craft . . . correct this for 'em. And they know little about the technique of winding a rubber-motor . . . with them it's either too many or too few turns . . . teach 'em to "feel" the rubber for tension and to stop winding

(Continued on page 32)



No modification of exact scale proportions are necessary



A "close up" of the nose

A GAS POWERED SE-5

By ARTHUR KRONFELT

HERE is a flying gas model for the World War model fans. The SE-5 is one of the few biplanes that will fly well. The wingspread is only 48 inches but it has enough wing area to take care of any 1/5 or 1/6 HP. motor. The model described here has a Cyclone "D" and weighs a little over three pounds ready to fly. The wings are demountable, making the model easy to carry. It was not necessary to make any changes in the length of the landing gear, size of tail surfaces, amount of wing dihedral, prop diameter, airfoils, number of

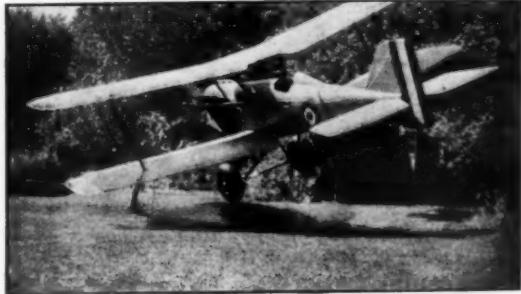
wing ribs or any other details. Anyone that has built a gas model before should not have any difficulty in constructing this model; but be sure to study plans carefully.

Fuselage

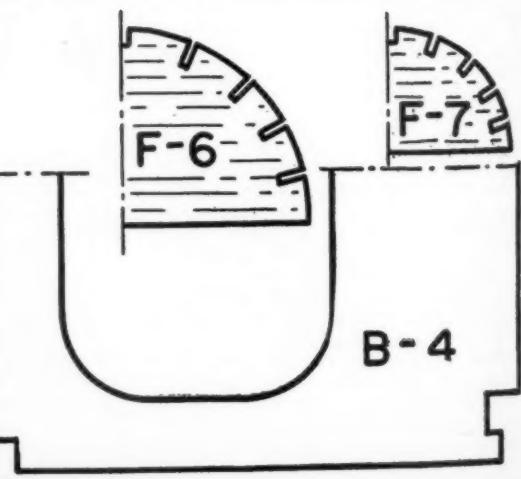
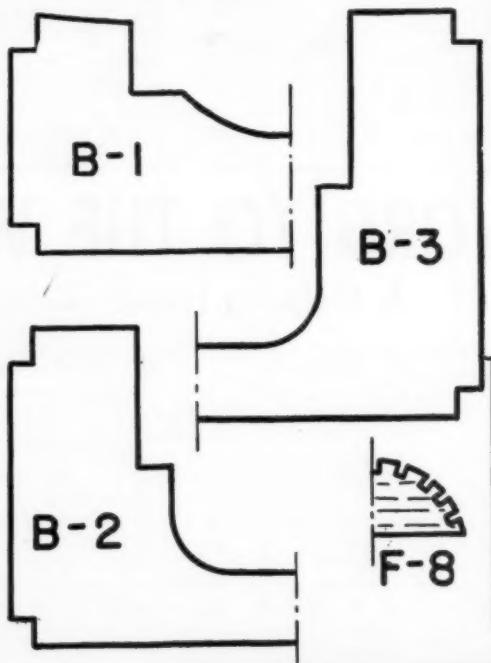
First it will be necessary to enlarge the plan four times to get a full size plan. Obtain a 10" x 36" board to work on. The fuselage longerons are 3/16" square spruce. The horizontal and vertical cross

members to the rear of cockpit are also 3/16" square spruce. All other cross members aft of the cockpit are 3/16" square hard balsa. The tail post is not mounted until after the stabilizer has been assembled on the fuselage. Place the fuselage sides over the top view of the plan. Cement cross members in place. Cut out the bulkheads from 3/32" plywood (bass or birch). The bulkheads are cemented to the sides of the cross members, not butted as in most cases. This makes a much

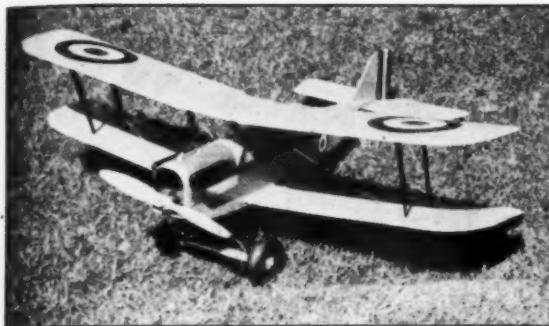
Gliding in for a landing at the end of a flight



TYPICAL WING SECTION



■ TYPICAL STAB SECTION ■



One of the most realistic models ever built

How You Can Build an Exact Scale Gas Model Of a Famous World War Biplane Fighter That Flies Consistently

stronger joint. Next cut out the fuselage formers from $3/32"$ balsa, and cement to fuselage. The stringers taper from $1/16" \times 1/4"$ to $1/16" \times 1/8"$. The $1/32"$ plywood fuselage rounding is butted against top side of the longerons, flush with the sides of the fuselage.

The motor is mounted as it comes from the factory. This becomes part of the motor mount. Other motors will require a motor bed. The dummy radiator is made

of white pine and ordinary house screen. The aluminum cowl, dummy motor banks and exhaust pipe (soft balsa) may be made later.

Landing Gear

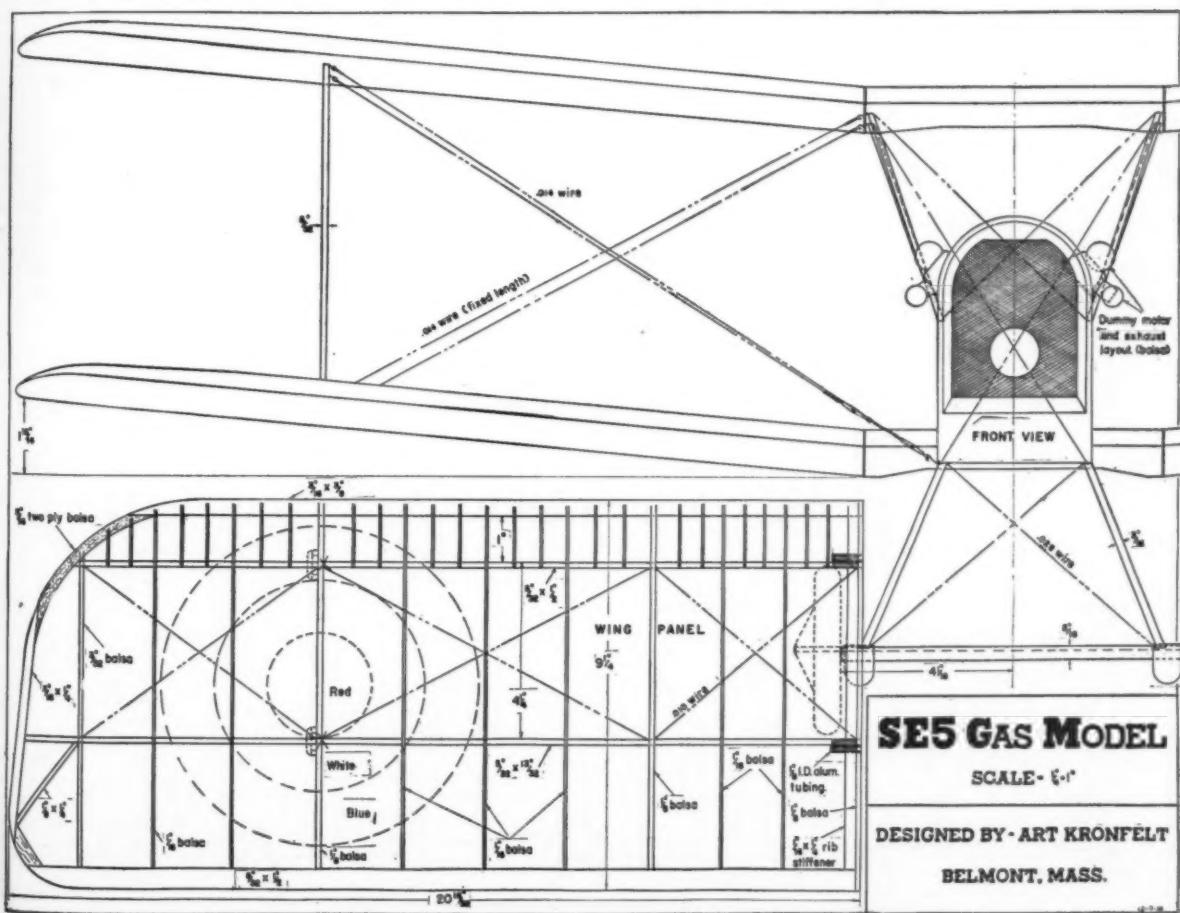
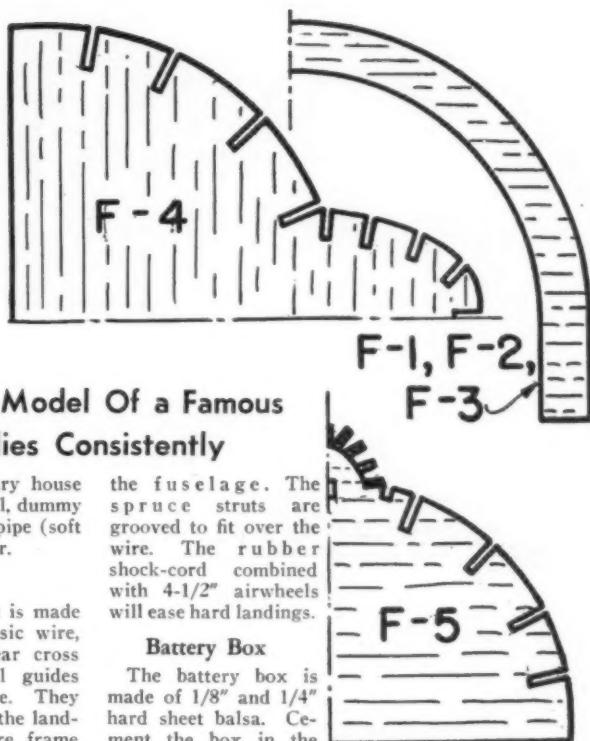
The landing gear frame is made in one piece of $3/32$ " music wire, with the break in the rear cross section. The axle travel guides are also $3/32$ " music wire. They are wired and soldered to the landing gear frame. The wire frame is wire-wrapped and cemented to

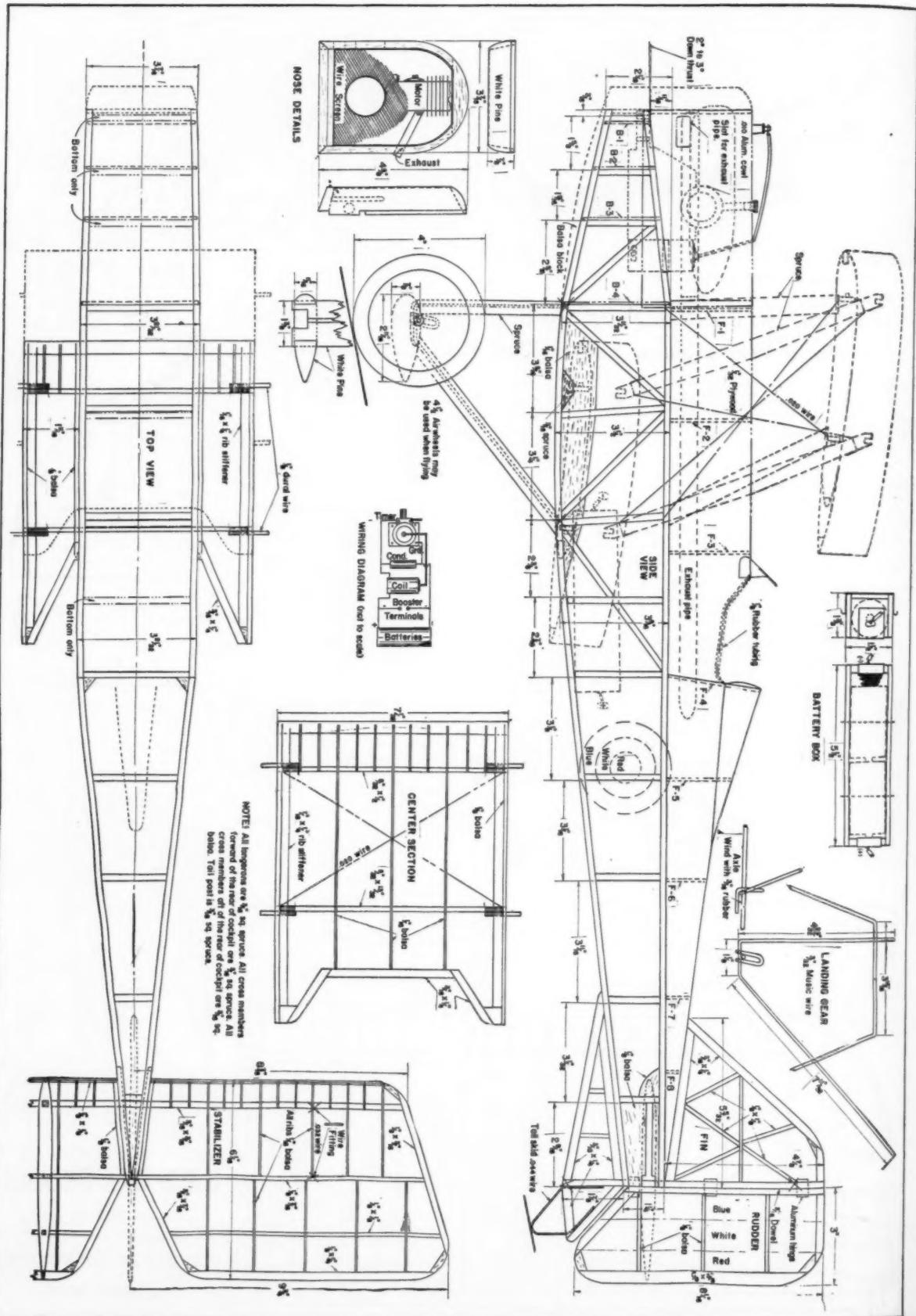
the fuselage. The spruce struts are grooved to fit over the wire. The rubber shock-cord combined with 4-1/2" airwheels will ease hard landings.

Battery Box

The battery box is made of $1/8"$ and $1/4"$ hard sheet balsa. Cement the box in the *(Continued on page 50)*

(Continued on page 50)





How TO MAKE YOUR MODEL BEHAVE

Article 84
Chapter 6

By CHARLES HAMPSON GRANT

How You Can Pre-
vent Crack-Ups of
Well Designed Models By Adjusting
Them Properly for Flight

ANYONE who may have participated in one of the large model plane contests invariably has one outstanding fact impressed vividly upon his mind. Namely, that the finest model, from a design or structural standpoint, does not always win. Thus it becomes evident that the technique used by the model flier has a great deal to do with the success of the flight. This is true to varying degrees in all cases in which the success of an operation depends upon the combined action of man and machinery.

Some mechanisms practically run themselves and one merely has to start and stop the process being carried out. In other cases the operator must make proper adjustments before, and sometimes during, the process in order that the desired results may be obtained.

In the case of full sized aircraft, the success of the flight depends upon: First, the proper design and building of the plane. Second, upon the correct adjustment of the units which generate forces that act during the flights of the craft. And, third, upon the ability of the pilot to make auxiliary adjustments required in the course of flight by means of the "control surfaces." The model builder may, of necessity, make use only of the first two factors that contribute to the flight of a "large" plane, unless some form of radio control is employed. During the flight of his model its control or stabilizing surfaces **MUST REMAIN FIXED**.

Thus the design of the machine, and the initial arrangement of the parts and surfaces must be of such a character that the model follows the desired predetermined flight procedure. A clever model designer does not have to be as clever in the technique of flying his model as a careless, haphazard one. Such an artisan may create a plane that will practically fly itself. All that he has to do is to set the control surfaces correctly before each flight. In fact in some cases the model will fly well with practically any control surface setting or with slight deviations from the theoretically correct one.

Nevertheless, the model "designer" can go just so far in respect to obtaining perfect flights.

At some indefinite point in the procedure the element of judgment in respect to the final adjustment of a model injects itself into the problem, often in a most disconcerting manner. In the final analysis it is this element of judgment that invariably produces the difference that exists between consistent winners and those who are just good model fliers.

The second factor, the correct adjustment of the units composing the plane, may be said to be on the borderline between good design and proper adjustment. *The value or amount of the element characterizing the adjustment definitely is a matter of judgment at the present time.*

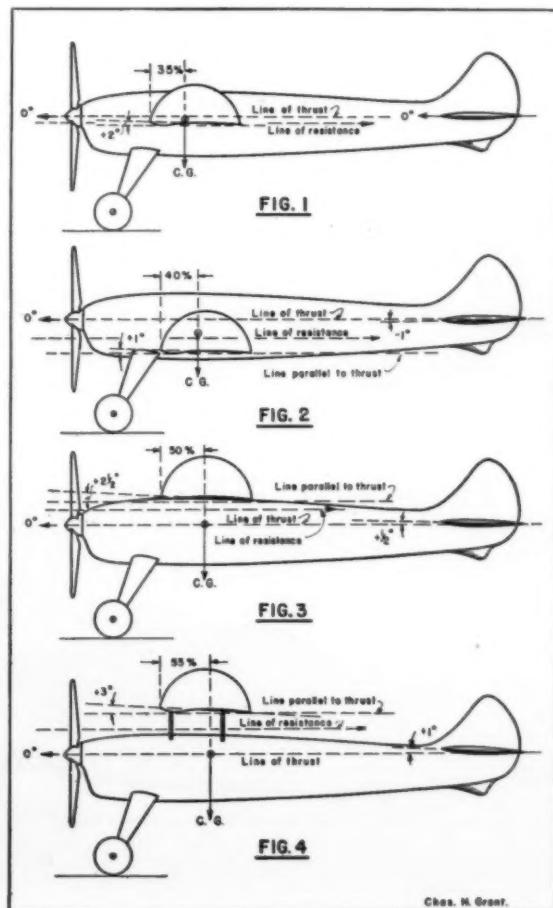
Previous pages of this series of articles have dealt extensively with the DESIGN of models, (the proportions they should assume) and in some instances with the ARRANGEMENT or DEGREE of angles that should characterize the assembly of factors involved.

However, the establishment of the correct character of the angular relationship between wings, stabilizer, fin and line of thrust, as well as of the position of the center of gravity, generally speaking, becomes a function of adjustment after the model builder has completed the structure of his plane. When it comes to the question of establishing the EXACT degree of angle to be used in any case, judgment, most assuredly, is the deciding factor.

For instance, every model builder knows that there should be a DIFFERENCE in angle between the wing and stabilizer of an airplane, in order to insure a degree of longitudinal stability and establish the TYPE of flight desired. However, the value or amount of angle that should be used in a particular case depends upon other factors which cannot always be calculated. One of these factors, for instance, is the position of the line of resistance. This cannot be determined exactly without involved and expensive tests which are beyond the capacity of the model builder to carry out. Thus judgment, based on experience, must be used.

The problem of adjustment is far more intricate for the model builder than it is for the large plane builder and flier. The model must be adjusted completely on the ground before its flight, so that the plane will fly in the manner desired and continue flying in spite of upsetting or interfering forces. This is due obviously to the fact that no adjustments may be made on the model during its flight. In the case of full size planes, operation of the controls by the pilot will bring about any minor adjustment that might be required.

Thus the model builder must know the effect on the plane that any particular adjustment will
(Continued on page 32)





The Boeing 307, thirty-three passenger stratoliner, landing after its test flight at Boeing Field

THE BELLANCA Aircraft Corporation is going to issue some more stock in order that it may have capital enough to work on two new military designs. Whether they will be for export or for our own air forces has not been disclosed. However it is likely that Bellanca may try to capture some of President Roosevelt's forthcoming big orders.

The Consolidated Aircraft Corp. is working on a new twin-engined design to recapture the patrol bomber business which they lost when Glenn L. Martin produced his gull-winged flyingboat to win the last competition. Vultee has taken on several more engineers to forge ahead on new designs. There is even

FRONTIERS OF AVIATION

plenty of activity at the plant on weekends as they are working overtime to get the new planes completed. We hear one will be a single-place pursuit!

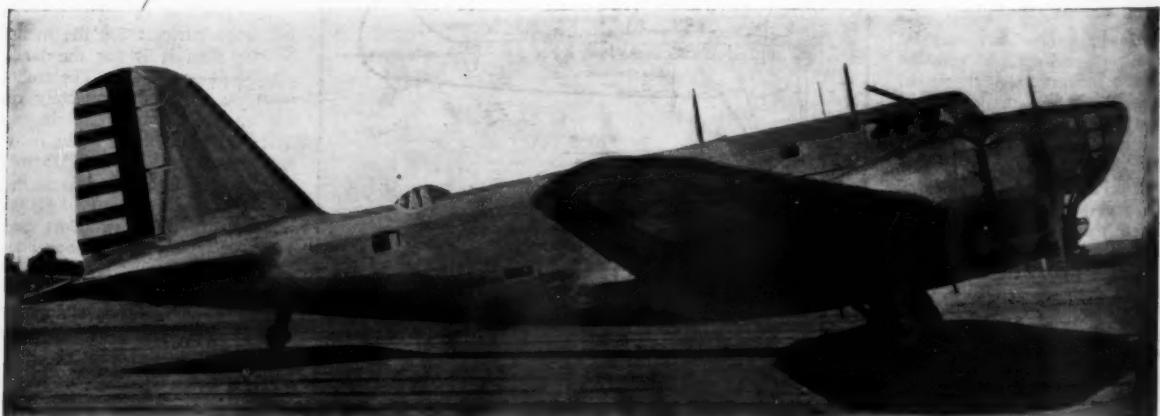
If one were to ask an Englishman what he thought of the recent Paris Air Show, one would invariably find that he liked it very much and that it was as big a success as last year's history making exhibition. Then, due to the patriotic blood that every Englishman seems to have overflowing in his veins, he would at once delve into the fact that there was a Bristol Blenheim, a Hawker Hurricane, and a Vickers Spitfire on display;



The Philips CT-1 trainer now undergoing acceptance tests. It is powered with an inverted Menasco

followed by some sort of remark that they were better than anybody else's airplanes and a dare for someone to mention any other plane at the show that compared with them. The Bristol Blenheim, resplendent in its natural silver finish, with a new enlarged nose so that now a person of over 65 pounds may fit into the forward gun turret, gave a Britisher reason for being proud. So did the two single-place interceptors with their clean lines. But an Englishman would not stop there. He would go on to say that they are nothing to what the English manufacturers are designing now. Wait until you see the new creations in the military line that will astound the world!

With the money that is being poured into the English aviation industry we will not have to wait long to see these new designs, and there is no doubt that they



The new U. S. Army Douglas Bomber with its new type of nose turret. (Morrison from Larkins)



DeHavilland Frobisher, fastest British airliner, that flies from London to Paris in less than an hour. (Monkmeyer)

BY

ROBERT C. MORRISON

will be well worth careful scrutiny. But to astound one in this day and age a person has to build far superior airplanes than the one that is to be astounded, and it is doubtful that Great Britain can progress rapidly enough in the realms of aerodynamics to put the aviation industry aghast. But let us see what Great Britain will have to accomplish to be world supreme.

First of all she will have to develop fighting planes with more than 50 lbs. per sq. ft. wing loading . . . and that is no pipe dream! When the time is ripe we intend to bring you full details of a new high-lift device that will permit such a wing loading and still enable the pilot to be in his right frame of mind after every landing. Believe it or not there are at least two American ships under test now with wing loadings up to 30 lbs. per sq. ft.!

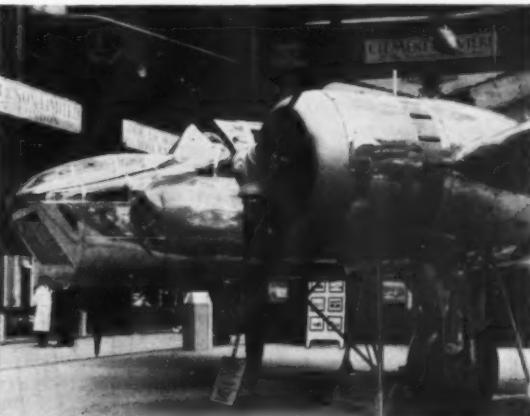
Then again England must develop engines of OVER 2,000 hp. of the "flat" type to lay in the wings with long shafts to hold the propellers out in undisturbed air. It was a few years ago that we first mentioned such engines in their early stages of design, and now that our predictions of the evolution of the 1,500 hp.-plus engine have come true we will predict that before a year from this date has passed we will see in this country airplanes with the "flat" type opposed engines mentioned above.



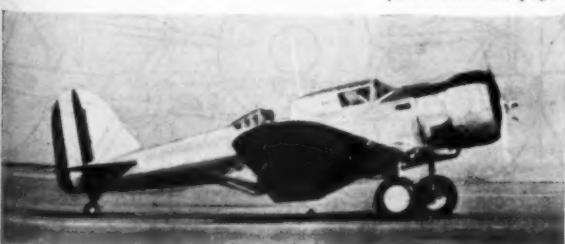
The Lockheed B-14, first of an order of 200 bombing planes to be delivered to the British Government. Here you see it landing during its test flights, manned by a crew of four. (Acme)

Now if England can attain those heights in wing loading, parasite drag elimination and horsepower—and they are what determines the speed of an airplane—more power to her. She has yet to be baptized into the tri-cycle landing gear deluge and the minor difficulties that arise from new ideas of that sort are not easy to elude. Then when she has delved into that she has to think of what to do with the cumbersome tail that

(Continued on page 36)



The latest Bristol Blenheim bomber with a new nose, as it appeared at the Paris Aero Show. (Flight)

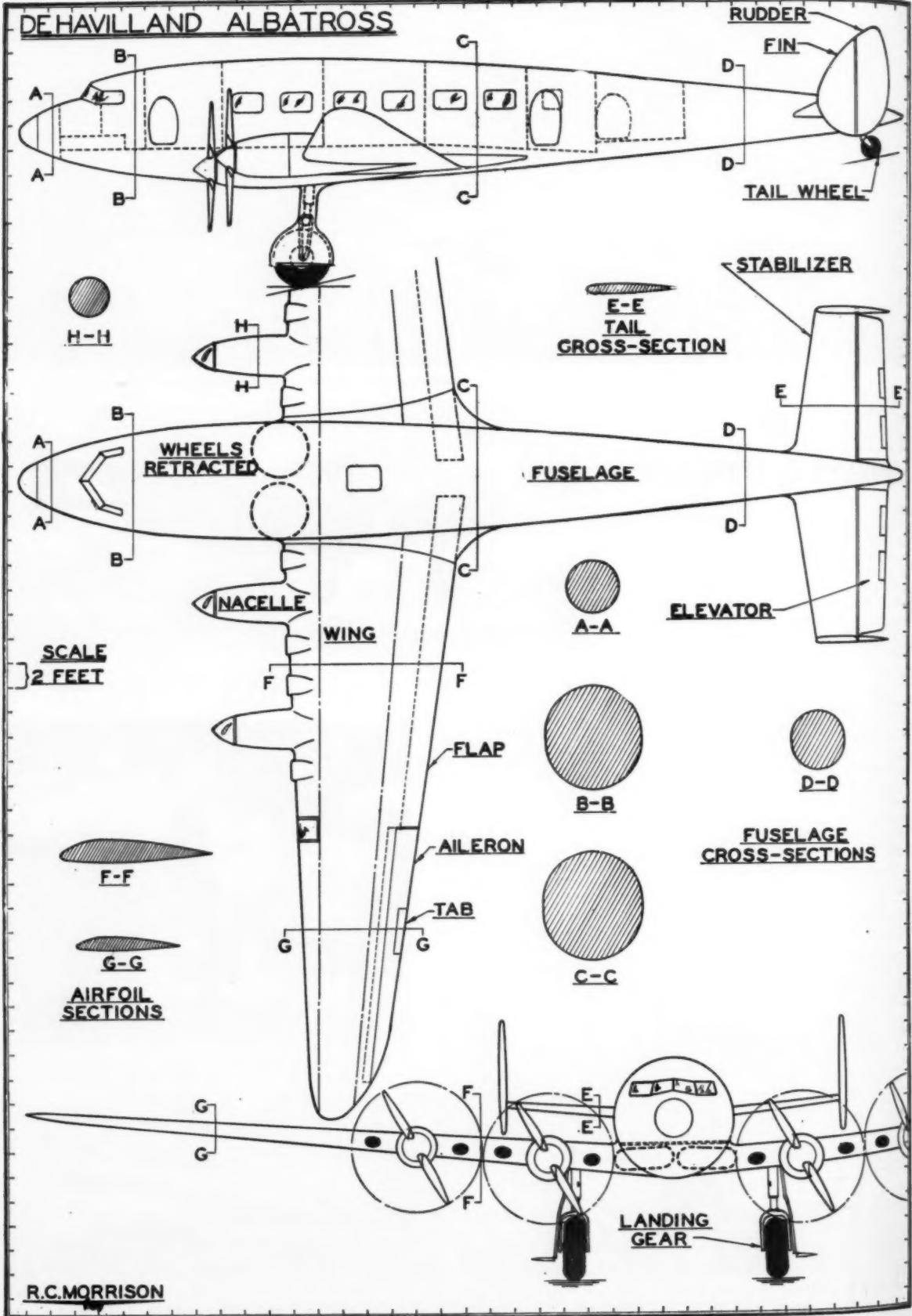


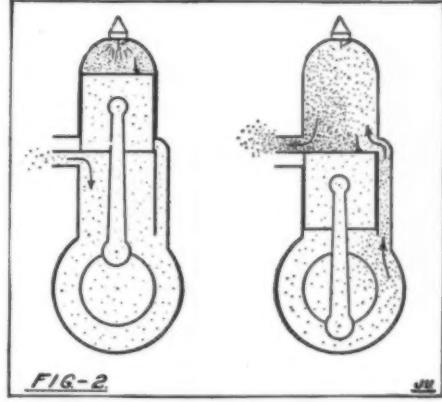
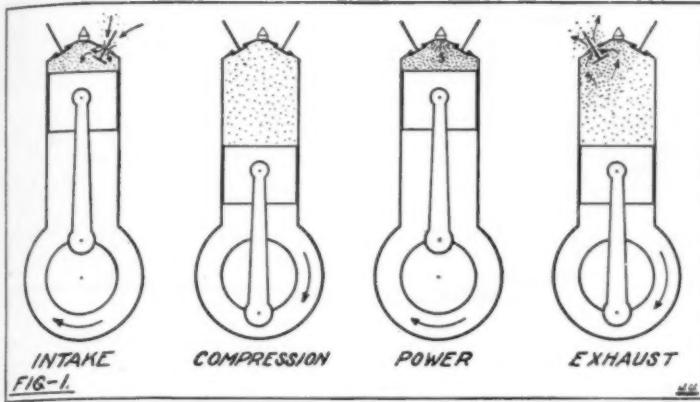
Latest type of Douglas attack bomber, built for Peru. Note gun put in belly aft of flap. (Morrison)



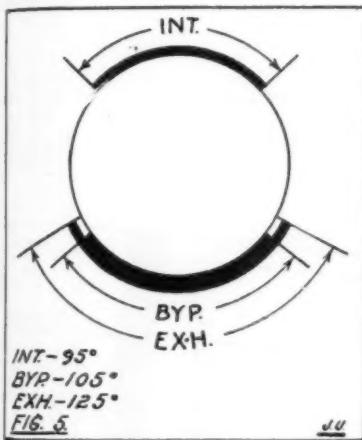
The new 1100 hp. Vultee V-12 attack bomber has rivets flush with its skin and butt joint covering. (Williams)

DE HAVILLAND ALBATROSS





WON'T it run?" "Can't you get it started?"—You often have heard these expressions, and similar ones, at a gas model flying field. And as usual, the designer or manufacturer of these small power plants is condemned to regions only a model builder could think of. Strange as it may seem, it isn't always the manufacturer's fault. It's true that some motors are better than others, but then again, production and price play an



important part in designing these small power plants. In the majority of instances when a motor acts balky the model builder himself is at fault. (This undoubtedly will increase my circle of friends (?) but nevertheless, it is true.) The sudden change from rubber to gas power in the United States may really be the reason. Model builders may know the relationship of the various forces acting on a model in flight, but that isn't going to start a stubborn engine and keep it running. A general knowledge of the design and construction of the two-stroke cycle engine, commonly used for model airplane propulsion, is necessary to achieve that rare distinction of having your motor start when you want it to. The next step is to know your own motor, because most of these small power plants have little problems all their own.

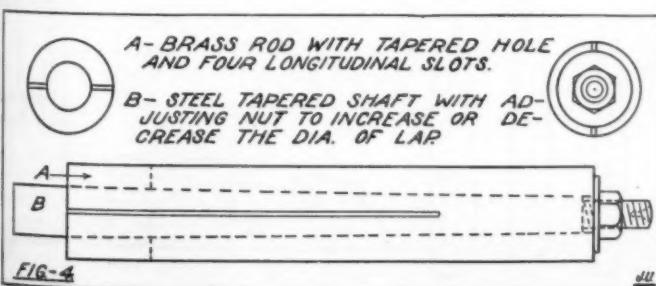
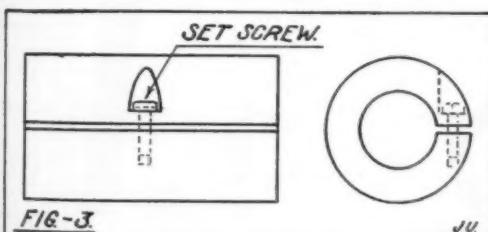
To date, few if any, articles have dealt with this subject. Therefore, the model builder is left with a power unit he knows little or nothing of.

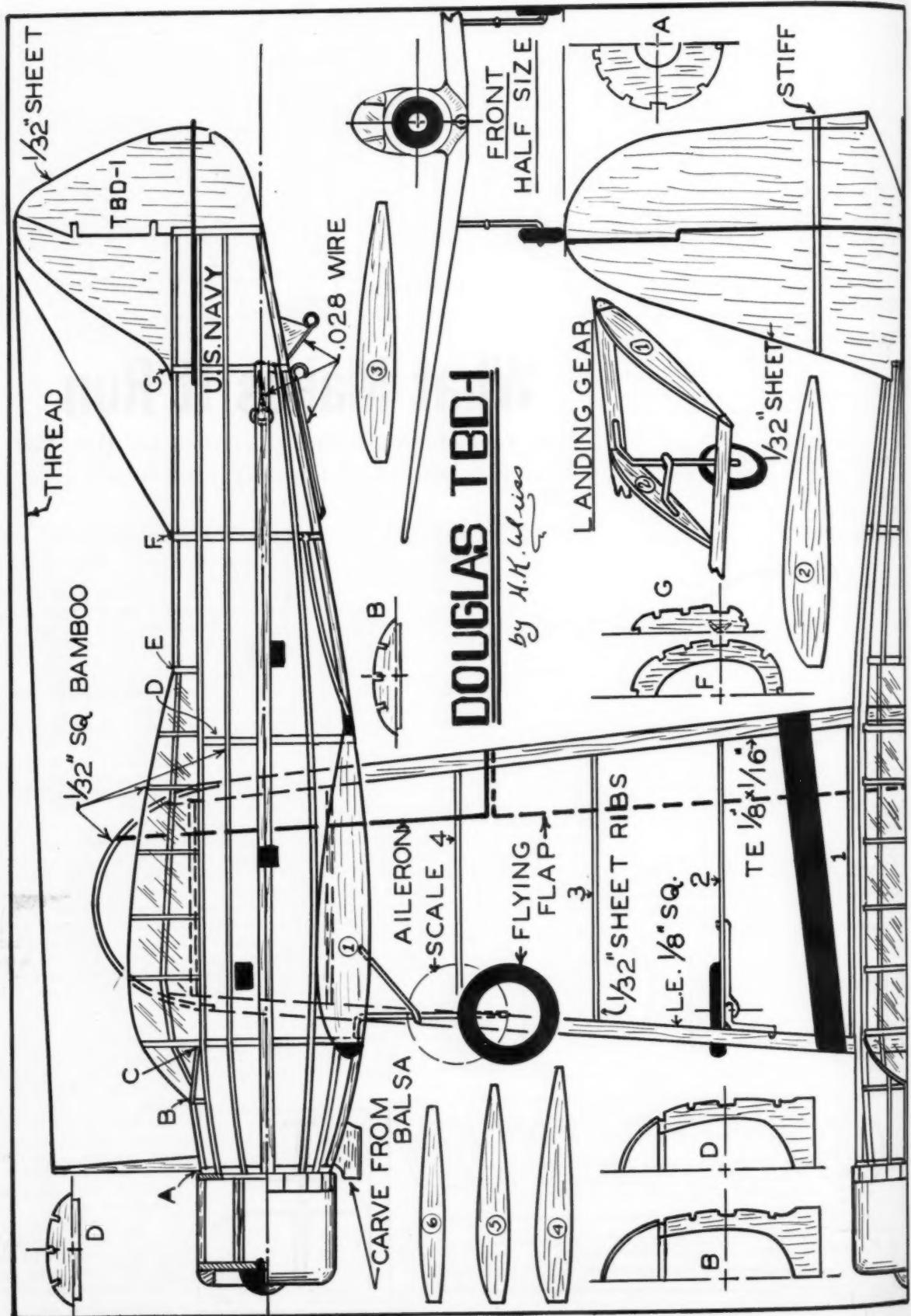
Fig. 1 illustrates the "four stroke" principle invented in 1862 by Dr. Nicholas A. Otto. The first of the series of drawings shows the piston about to descend with the intake valve open. This

is known as the intake stroke. Next we have the piston ascending with the valves closed, therefore compressing the charge. Before reaching the top of the stroke the fuel is ignited, causing it to "explode" and send the piston downward. This is the power stroke. The exhaust valve now opens, permitting the ascending piston to force out the exhaust gases. From the foregoing description, we learn that there are four phases in the operation of a four stroke namely: intake, compression, power and exhaust. It is important to remember that these four phases hold true to all internal combustion engines including the Diesel.

When the word explosion was used, it was set off in quotation marks, describing what took place when the fuel was ignited. This expression is often used for this purpose, and is frequently misunderstood. The true source of power in an internal combustion engine is a very rapid combustion. The heat from the burning fuel causes the gases confined in the compression chamber of the cylinder to expand, creating enormous pressure. This pressure is three to four times greater after combustion, and is further increased by compressing the charge before ignition. To obtain a more rapid combustion, thereby increasing the pressure, the spark is advanced before "top dead center." This gives the fuel a longer time to burn, creating more heat and pressure at the crucial moment, which is the top dead center of the piston travel.

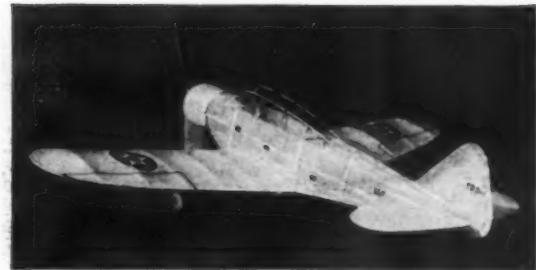
Fig 2 defines the action of the "two-stroke," originated in 1878 by Sir Dugald Clerk. This engine uses the four phases (Continued on page 52)







The completed model in full flight shows great steadiness



Intriguing details give a realistic appearance

BUILDING THE DOUGLAS TORPEDO BOMBER

ONE of the latest of the navy's sleek torpedo planes is the Douglas TBD-1. Flying under a double classification, the TBD-1 carries either bombs or a torpedo at an estimated top speed of 235 m.p.h. Since the ship will be used aboard carriers, space is an important factor, and the wings of the TBD-1 fold up and in on themselves from a chord about midway to the tip. The experimental version of the torpedo-bomber had a straight cockpit housing, but the accepted version has had the housing humped, probably to accommodate the directional loop of a radio antenna. The engine is a Twin Wasp of 850 horsepower.

Because of the comparatively small size of the model, there are certain points which must be stressed in construction. They are as follows:

Sand the fuzz off all balsa used in the model before using it; the frame will be lighter, cleaner and stronger. Use plenty of cement; the small additional weight is negligible against the gain in ruggedness and freedom from warping. Keep the tail of the model light; every weight you put on the nose for balance will mean just that much more weight that the ship has to carry, and it's a small ship! And remember, a little mistake on a small ship is equivalent to a pretty big one on a large model.

Wings and Tail

Make the wing first, as it's used as a jig for the fuselage. The frame can be assembled on the plan, if the left wing panel is traced on another sheet of paper and pinned down in its proper place. The wing is built in one piece. Put waxed paper over the plan, pin the leading and trailing edge in place, and add the ribs and wing tip. Use plenty of cement. The bamboo for the wing tip can be bent over a flame, or, as it is very thin, it will bend easily without heating and can be tied in place with silk thread

Some model builders think that a small plane will not fly well. This little ship will explode such an opinion. It has been flown repeatedly for more than 25 seconds indoors and outdoors; one of the few small models with a big performance.

joint. Cement bulkheads C and D to the wing center section in the position shown on the plan. Now cement the $1/8 \times 1/16$ " main side stringers to these bulkheads, and add the remaining bulkheads to the $1/8 \times 1/16$ " stringers, being careful to keep the bulkheads lined up correctly. Complete the fuselage frame by adding the $1/32$ " square bamboo stringers, formers B and D, and the $1/16$ " square balsa top and bottom stringers. The tail post is $1/16 \times 1/8$ " balsa.

Cowl sections are round, so that the diameter of the cowl formers can be taken from the plan, and the sections drawn on sheet balsa with a dime compass. Cover the cowl

while the cement is drying.

When the frame is dry remove it from the waxed paper and with a razor blade cut loose surplus cement and any waxed paper which may have adhered. Crack the spars just outside rib 1 and give the wing $3/4$ " dihedral at each tip. Re-cement the spars, and when the cement is dry shape the leading and trailing edge to airfoil shape with a razor and sandpaper.

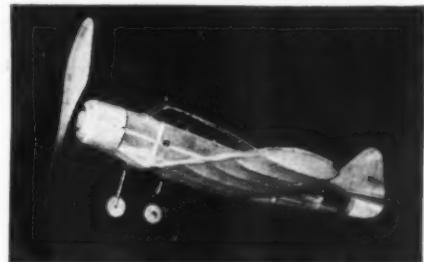
Trace the tail surfaces on $1/32$ " sheet balsa and cut them out. The stabilizer is made in one piece. Sand the pieces smooth. Cement the $1/32 \times 1/16$ " stiffeners on top of each side of the stabilizer.

Fuselage

Cut two halves of each bulkhead from $1/16$ " sheet. As the fuselage must stand handling do not substitute $1/32$ " sheet. Cement the halves together, using small lengths of $1/32$ " square bamboo across the grain to stiffen the assembled bulkhead crossways at the

with $1/32$ " sheet balsa, and sand the whole cowl after assembly until it is smooth. A small hard-wood nose plug is used

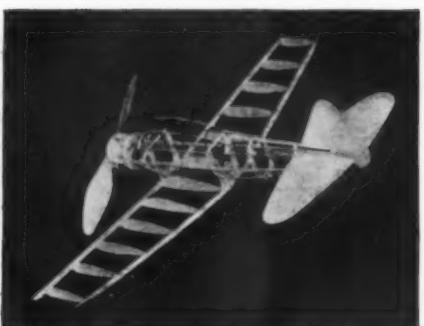
(Continued on page 51)



It has a comparatively large "prop"



The framework is well designed



It is simple and easy to build



Pict. No. 1. Down on the farm (1939 version). Melvin Phillips' plane in flight



Pict. No. 2. Bob Crea's and Bill Pfeil's "flying wing" that rides the air down in San Antonio, Tex.



Pict. No. 3. A sleek all balsa cabin gas model of correct design, by A. C. Mora



Pict. No. 4. One of the most perfect scale gas models ever built. By Ernesto Handl



Pict. No. 5. A clever amphibian that flies beautifully

GAS LINES

Official Section of the National Aeronautic Association
Gas Model Division

The Gas Model Pioneer Certificates Are Ready

known, and here you see how it has been applied to aviation. The picture was taken at the Phillips' farm in Ogden, Utah, Box 279, Route 1. In the foreground you see Melvin Phillips anxiously watching the course of flight of his model. In the background apparently are other interested members of his family. This shows very clearly the latent interest that every American has in aviation.

The model in the picture was built by Melvin, and he tells us that his best flight is $1\frac{1}{2}$ hours with a motor run of two minutes. He is now planning to build a radio control model, powered with a Forster Brothers motor. Phillips deserves a great deal of credit for his developments in this sport.

Picture No. 2 shows a flying wing which was designed and built by Robert Crea and William Pfeil of San Antonio, Texas. It is a real performer and space alone prevents us from printing pictures which were sent us of it in flight. Mr. A. P. Herff of 110 Broadway, San Antonio, Texas, sends us some information concerning it. He says:

"It has a wing area of 300 square inches and uses a Gottingen 387 airfoil. Its total weight is one pound, two ounces, and is powered with a Brat motor."

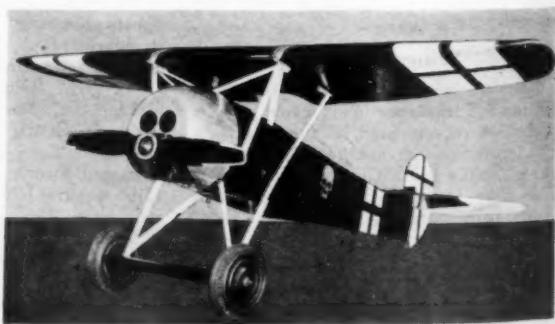
Mr. A. C. Mora of Oxnard, Calif., Box 81, sends us picture No. 3, showing a sleek cabin job. It is of all balsa construction; the fuselage being covered with $1/16"$ sheet. The wing has only (Continued on next page)



Pict. No. 6. Walter Good and his record plane



Pict. No. 7. The Marshfield Gas Model Club and their plane



Pict. No. 8. At last, a World War gas model. (Fokker D-8)

six ribs and is covered with balsa. The Grant X8 airfoil is used. The span of the wing is 28 inches, and the chord 13 inches. Ready to fly, with a Forster Brothers motor, it weighs 65 ounces or about ten ounces per square foot wing loading. Mr. Mora intends to equip it with a radio control, which Mr. N. R. Smith of Los Angeles is now perfecting.

Gas model flying is also progressing in Argentina, for we have a letter from Mr. Ernesto G. Handl, Bvd. Ordone 866, Rosario de Santa Fe, Argentina, South America. He writes to us in Spanish, so readers will please pardon any mistakes in our translation of his letter. Picture No. 4 shows a beautiful Boeing F4B-4 powered with a Brown Junior motor, which he has built. He tells us it has caused much interest among his friends and they all wish data from which they can construct planes of their own.

Mr. Handl mentions he has noticed in MODEL AIRPLANE NEWS certain formulas and rules for the design of these models, and he wishes permission to use them. This is gladly granted, for the formulas were put in the magazine for model builders to enable them to design and build better planes.

Mr. Handl has been building planes for eight years and has constructed over 25 models of various types. The little ship shown in the picture speaks very well for his ability as a builder. Every detail has been carefully considered and worked out. However he does not tell us whether or not the flights of this ship were successful. We will be very interested in hearing about these.

Speaking of unusual types of planes, here is one shown in picture No. 5. Usually hydro's are quite heavy due to the weight of the required float. However in this case, this problem has been taken care of in a unique fashion by its builder, Paul E. Deschene of 18 Oliver Street, Salem, Mass. The float serves as a fuselage as well as fulfilling the functions required of a hydro. The tail is suspended by a boom composed of two outriggers braced to the rear of the float by means of two struts in "V" formation. The motor is mounted high, well up out of the path of spray. This plane was designed a year ago. He says he believes it is the only 100% amphibian built in New England. The total weight of it is six pounds; its power being a Tom Thumb engine. Deschene says this engine is pretty small for the ship and it is taking a terrible beating for this reason. The average time when flown from the water is about four or five minutes, taking about one or two minutes to take off, depending upon conditions of waves and wind. On land the performance is slightly better.

Deschene deserves a great deal of credit in producing this plane, as it is not an easy task to design an efficient hydro. They usually act balkier than a mule when getting off the water. He tells us the float works perfectly and nicely overcomes the problem of suction, which is the "bug-bear" of all model hydroplane fans.

The landing gear of the model folds up under the wings when the plane is being flown from the water, or it can be taken off. He says if anyone wishes any advice on amphibians he will be happy to give any

data he may have. This may save them from much anguish and many heartbreaks which he went through during the months of working and figuring out the plans.

Picture No. 6 shows Walter Good of Kalamazoo, Michigan, preparing his plane for flight. This little ship holds the official N.A.A. record of 24 minutes, 4 seconds, made under N.A.A. rules at the Scripps-Howard Contest in Akron, Ohio. The ship has probably won more prizes in the short time of three months than any other gas job ever built. It won second place at Marshall, Michigan; first place at Grand Rapids and Jackson, Michigan; second place at the Midwestern States Meet at Chicago, Illinois and Akron, Ohio. The prizes won at these various meets would equip a complete model shop, besides one which was a trip by air to Hollywood for a week. Walter is a member of the Kazoo Aeronauts of 211 Woodward Avenue, Kalamazoo, Michigan; a junior chapter of the N.A.A. We are indebted for this information to Sam Folz, Publicity Chairman of the club.

A group of young men in Marshfield, Wisconsin, decided they'd like to build a gas model plane. As each one felt that alone he would be unable to finance building such a ship, they clubbed together into an organization called the Marshfield Gas Model Club. A membership fee of 25¢ a week was charged. This was saved until there was sufficient funds to purchase a kit. The club started building the plane and continued saving until they had sufficient funds for a motor. Finally the plane was completed, which they have called the "Spirit of Fun." The group is shown in picture No. 7 with their ship. They have voted to continue the payment of dues and are now working on a biplane which they intend to equip with radio control. In time they hope each member will have his own ship.

This plan of operation may serve as a basis for other young men who feel they are unable to individually afford the price of a plane. The club idea has worked out well on a number of occasions. We are indebted to Mr. S. A. Marvin, Secretary of the club, for this information.

Take a look at picture No. 8. Here is a little ship that will stir the pulse of wartime plane builders. You will recognize it as a Fokker D-8, that famous German ship which swept the skies back in 1917-18. This model was built by George Thompson of 771 Dudley Street, Dorchester, Mass.; who, believe it or not, has powered it with a Brown motor. The span of the ship is a shade under five feet and has a length of three feet. It has been used as an exhibition plane at the local theatre in conjunction with the motion picture "Men With Wings." The gas tank is located in the small streamlined wing between the wheels. Mr. Thompson says it has a rather high wing loading and is brutally fast. Thompson belongs to the Dorox Gazz-O-Leers, composed of fellows from Roxbury, Boston and Dorchester. At present there are only five active members, though originally there were fifteen. He says that the club has produced thirty models, and with the beginning of spring he believes that the membership will increase sharply. They are looking forward to an active season. Good luck to them.

Minnesota

Dr. L. M. Dahl, who is a surgeon dentist at Twin Valley, Minnesota, writes and tells us of the gas model club which has been formed in his city. It consists of twenty members and at the present time they have four gas jobs; two completed and two in the course of construction.

Mr. Dahl built a "Miss America" powered with a Baby Cyclone motor. On its first flying it "lit" in the middle of a cornfield after a flight of 13 1/2 minutes. Strange to say, the plane did not suffer a single scratch.

Pennsylvania

Mr. Fred Elliott of 526 Hyde Avenue, Ridgway, Pa., tells us that he has found the string method of testing his models very satisfactory. This has been described before: He attaches a 25 to 50 foot length of stout fishline to the rear of the fuselage. When he wishes to start his plane, after the motor has been revved, he grasps the cord at a point about half its length from the plane. He then lets the plane gather speed and runs behind the model as it begins to rise. The cord is played out as required. After the plane has started on its flight any poor adjustment is immediately evident. If the adjustment is poor a slight tension on the string slows down the plane so that it settles back to earth. If everything is O.K. the string is released and the plane goes on its way.

He says in this way he has tested his TD Coupe and found it was nose-heavy. After correcting this, by moving the batteries back, he set the rudder for a turn against the torque. In flying it with this adjustment it refused to climb. Gaining only about ten feet of altitude, it began to circle. Unfortunately it picked out a tree to land in.

Elliott wishes to know what he can do to make the plane climb with the present motor. Usually the lack of climb is due to poor arrangement of the wings and tail relative to the thrust line. A set-up which usually gives good results is as follows: Angle of incidence of the wing relative to the thrust line, three degrees. Angle of incidence of the stabilizer relative to the thrust line, half a degree. Center of gravity located at about the center of the wing or slightly forward of it. Under these conditions the rudder should be absolutely neutral or turned very slightly to the right. This will have a slight tendency to overcome the torque effect.

California

Mr. Arthur Snyder of 630 North Alvarado Street, Los Angeles, Calif., writes and tells us that Leslie Zeider of Romoland placed first in the Southern California Gas Model Association's meet held December 11th. His ship, an Ohlsson Pacemaker, was powered with an Ohlsson Gold-Seal motor. The winning time was over ten minutes. Second place was won with a time of 9:56 minutes. This model was a Megow Cardinal powered with an Ohlsson 23.

Connecticut

Revision of Gas Model Regulations
Connecticut Gasoline Model Regulation Number 5 is hereby further revised to
(Continued on page 63)

Air Ways

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World

AS THIS is being written, a breath of spring-like air comes sifting through the windows of our editorial offices, inspiring haunting visions of future model activity under balmy skies. Winter has merely had a relapse, we fear, however.

Judging from the activity among model builders we realize that they are preparing themselves for a very active season in the not-so-distant future. With the advent of each year we wonder what new ideas have been born during the winter months that eventually will be brought out into the light of day during the active flying season.

In the past it appears that builders have been content to "play the same old tune" with variations, instead of developing designs and structures which are radically different. "Old Men Inertia" has captured their minds and, generally speaking, has kept them in the same old rut of orthodox designs. We wonder when some agile mind will be inspired to hurl itself out of the groove into which most of us have slumped, and change the course of events in the model field.

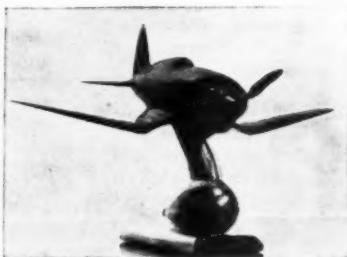
This would be a diversion for many of us who have become rather fed up with merely changing the shapes and positions of fuselage, wings, etc.; instead of wrestling with the problems presented by some new scientific developments. Perhaps some of our readers feel the urge to create something different. If so, we hope they will not "hide their light under a

bushel," but will send us information and pictures of what they are doing in this line. . . . Something different . . . out of the ordinary . . . that will start us on a new trend of thought. This, after all, is really what makes life—and the model game—more interesting.

Henry Clark of 46 Fort Washington Avenue, New York City, is one of these persons who has a certain amount of originality of thought. Not that he has created new designs, but at least he has created new effects in

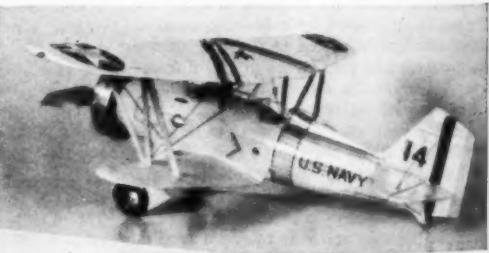
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Pict. No. 5 & 6. The Original Design Contest winner, Glen Wood and his tricky plane



Pict. No. 3. F. Cunningham's brain-child

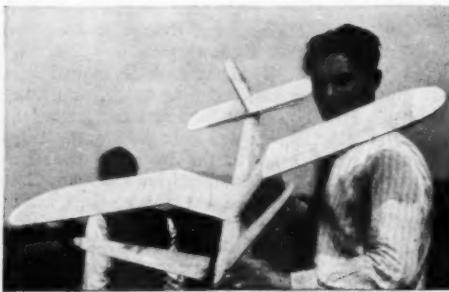
Pict. No. 4. Dick Worrell's Wakefield with a hexagonal fuselage



Pict. No. 2. A Curtiss F11C-4 built by Halsey Knapp



Pict. No. 7. L. H. Annesley weighing in a "Korda"



Pict. No. 8. A model propelled by flapping wings



Pict. No. 9. Getting his wings

respect to photographic art. This can be seen by his contribution, picture No. 1. Although the ship shown is an orthodox Ford Tri-motor, Clark has created a very artistic appearance by special lighting effects and motorizing the propellers. The work on the model is beautiful in itself, and from the general effect it is difficult to determine if this is a large ship or only a model plane. What cannot be seen in the model are the movable controls and the details of the cabin, which are executed in a most complete manner.

Another fine example of detail model building is shown in picture No. 2. This is a Curtiss Hawk F11C-4, constructed by Halsey W. Knapp of Palatka, Florida, P.O. Box 332. It is equipped with an electric motor, which spins the propeller, and real flying lights; also movable controls. One of the interesting details is the manner of binding together the landing and flying wires, which is carried out in the exact detail of the large ship.

Frank Cunningham of 1820 H Street, Sacramento, Calif., is one of those builders who is getting out of the rut of orthodox procedure. Picture No. 3 shows one of his models of original design. It was inspired by the drawing of the fighters appearing on the cover of the December issue of MODEL AIRPLANE NEWS. It is not a model of an actual ship, but typifies what Cunningham thinks a pursuit ship should be like—a very constructive manner of self-expression. He says that he plans to commercialize his hobby.

Picture No. 4 shows a Wakefield model which Richard J. Worel of 1447 West 17th Street, Chicago, Illinois, entered in the 1938 Nationals. It is a very graceful looking job and we are sorry we cannot tell you how this model placed in the competition. The parasol wing should have given the ship a very sharp climb; for, as many builders know, this type of design has a tendency to climb at a steep angle. Besides having very graceful lines the construction is exceedingly fine.

Now we are pleased to give you the results of the Original Design Contest for this month. Mr. Glen Wood of 228 Ridge Avenue, Kittanning, Pa., wins the award. He is shown in picture No. 5 with his model of original design. Concerning it he says:

"The model has a very short wing span and at each wing tip a hollow tube is mounted. The ailerons are placed at the trailing end of each tube. It has a three wheel landing gear with the single wheel placed in the center of the fuselage at the trailing edge of the wing."

Mr. Wood does not give us any idea concerning the effects of these tubes on the flight of the plane. An account of the results of his experiments would be interesting. However here is the idea for you to work on, if you choose to do so.

Picture No. 6 shows the plane in flight. From the appearance of the ship in this picture we would say that it had insufficient lateral stability.

Model News From Other Countries

Australia

Mr. L. H. Annesley, Honorable Secretary of The Model Aeronautic Association of Australia, 31 Coventry Street, Home-

bush, Sydney, New South Wales, sends us picture No. 7 and some news of activities in his club. The picture shows Mr. Annesley weighing in a Korda tractor at one of the monthly contests held here. This photo was taken in November, which season is the beginning of summer in this section of the world. He tells us that later the model was smashed when it landed in a yard with four or five greyhounds—who apparently mistook it for a rabbit and tore it to pieces.

Germany

Mr. Hans Justus Meier of Osterstr. 23, Bremen, Germany, sends us picture No. 8, which shows one of the most interesting planes that appeared at the German National Model Contest. It is an ornithopter; or more accurately, it is a regular glider with ornithopter propulsion. You will note the small wings in the front. These wings propel the plane by flapping up and down like birds' wings. As they operate they flutter to produce the proper rearward thrust component. The ship is very stable, and Mr. Meier tells us that after some adjustments it flew out of sight. It was brought out to the field by Mr. Lippisch, one of the prominent men in the German Research Institute for Glider Development.

England

Mr. Vic Ball of 118 Hither Green Lane, Lewisham, London S.E. 13, England, wishes to correct our impression that the pick-a-back plane built by Ken Werner and Bill Price (shown in our January issue) was the first pick-a-back combination to be created. He says that he definitely assures us that several rubber powered ones have been made in England. One of the English magazines actually has published a cutaway drawing of the mechanism which was used to release the small plane from the back of the large one.

Raymond S. Pulfer of 74 Rookery Road, Selly Oak, Birmingham 29, England, writes and tells us:

"I would like to draw your attention to an article in your paper, MODEL AIRPLANE NEWS, for January 1939, which erroneously reports the Air Minister for this country as being Sir Samuel Hore-Belisha. I would point out that Mr. Leslie Hore-Belisha is Minister for War and has never been the Air Minister. The present Air Minister is Sir Kingsley Wood."

CLUB NEWS

Saint Louis

One of the largest and most active clubs in the country is the Stix, Baer and Fuller Model Airplane Club of Saint Louis, Missouri. Picture No. 9 shows Mr. Bob Sommers, its director, presenting a star pin of membership and membership card to Bobby Breen, eleven year old screen star. At present the club has a membership of 2183, of whom 916 are active.

Syracuse

The Syracuse Model Airplane Club, chapter of the Junior N.A.A., with headquarters at the Y.M.C.A., Syracuse, New York, will hold a state exchange meet in Sydney, New York, in May. Details of the contest will be given later, or they may be had by writing Mr. Edward R. Guth at the above address.

Philadelphia

The Philadelphia Model Airplane Association, of which Mr. Victor R. Fritz is Field Director, will hold the following contests in March and April:

March 4th, Fourth Flying Scale Model Meet; March 11th, Fifth Junior & Senior Indoor Meet; March 18th, Fifth Novice Meet and Training Session. April 1st, Fifth Flying Scale Model Meet; April 8th, Sixth Junior & Senior Indoor Meet; April 15th, Sixth Novice Meet & Training Session. All meets are sanctioned by the N.A.A.

For further information write Mr. Fritz at 1427 Spruce Street, Philadelphia, Pa.

Boston

The Jordan-Traveller Aviation League of Boston, Mass., has been doing great things. Recently they have built a wind tunnel which League members inspected on January 18th. Mr. Bruno Marchi is largely responsible for the successful completion of it, in conjunction with Mr. Hewitt Phillips. This tunnel will be used for low air-speed tests; and results obtained in it will be published in MODEL AIRPLANE NEWS from time to time.

Daytona Beach

Mr. Charles A. Faralelo of 634½ Mulberry Avenue, Daytona Beach, Florida, Director of the Daytona Beach Model Airplane Club, tells us that they have none other than Mr. W. T. Thomas, formerly of the famous Thomas-Morse Corporation, as one of the advisors of the club. Mr. Thomas, it appears, has gone "model crazy." Last Thanksgiving Day he entered a state contest in Lakeland, Florida, and won first place in the gas model event. Usually it is the other way around—model builders develop into large plane builders; but in this case the situation appears to be reverse. Mr. Faralelo says that they also have Mr. George Rimmer as a club member. Mr. Rimmer flew for the English Government during the World War.

The P.W.A. sent an instructor to Daytona Beach to organize clubs throughout the state; and after three weeks of instruction there were 83 pupils attending the meeting at Daytona. This will make the club one of the largest in the state.

They are now planning to hold a South-Eastern Championship Meet in Daytona Beach this summer, and the Grand Prize Winner will be sent to the Nationals. Mr. Faralelo would like to hear from contest directors from the Carolinas, Georgia, Alabama, Mississippi and Florida, who may be interested in participating in such a contest.

Salt Lake City

The Model Aeronautical Research Club of 435 South 11th East, Salt Lake City, Utah, is planning to hold its second annual spring contest on May 21st, 1939. Rules will be ready in a very short time. Complete information may be obtained from the secretary, Burton DeMarais, at the above address.

Detroit

Detroit's first city wide model aircraft contest restricted exclusively to boys under 16 years of age was a standard R.O.G. (Continued on page 66)



SPECIAL TO MODEL AIRPLANE NEWS:

FROM an uncontradictable source far removed from the cancerous effect of insidious propaganda, we have received confidential information which enables us to announce the unimpeachable news that Germany has an Air Force of NINE THOUSAND fighting airplanes! MODEL AIRPLANE News is thus, once again, the exclusive agency of presentation of news which should have a far-reaching effect upon our nation and its viewpoint on international affairs militaire. This news was known by Prime Minister Chamberlain last November and can be considered the undeniable basis upon which his two flights to Germany culminating in the historic Munich Conference were made.

However, it has just been made known to FLASH NEWS and now becomes public property. Where now are the self-styled military "authorities" and cynical debunkers of Nazi airpower who have so vociferously damned these rumors as such and nothing more? With this news must come the realization that Germany has no fear of any nation or combination of armed forces and that Herr Hitler will not be stopped by pusillanimity instilled by threats of retribution. Behind him stands the largest armed force of fighting ships the world has ever known and with such power clutched tightly in one fist who dares think of the blows his other might strike against all that civilized man stands for? The airplane, a product of civilization, now threatens its destruction. Only the construction of a like-force capable of adequate national defense can possibly protect us. May the leaders of our own nation give it to us.

As a result of tests at Villacoublay, the French air center (mentioned last month), Mr. Koolhoven states that he has received a substantial order for the FK-58 from the French Air Ministry.

As a result of exhaustive work in the Spanish War the ubiquitous Fiat CR-32 has been redesigned. It now mounts a two-row Fiat radial air-cooled engine of 840 horsepower. The long-chord cowling, landing gear, wing structure and bracing and tail surfaces have all been cleaned up and has resulted in a considerable speed and maneuverability improvement. These new models are being rushed into Rebel Spain as hurriedly as possible. Another new Italian fighter is the Macchi monoplane with a similar Fiat two-row radial and retractable undercarriage. Its cowling is the snug-fit louvred design and a top speed of 345 miles per hour is claimed. It has not been used in the Franco campaigns due to a nasty habit of shedding its wing, so embarrassing to its obviously occupied pilots. Strengthening and production are now under way.

The first of three Sikorsky S-43 amphibi-

bians for France's African "Aeromaritime" airline has been completed and is en route to French pilots. These ships have generously upturned wingtips for reasons which are not apparent, for the production models will continue as straightwings.

The absolute freedom of American racing pilots in the design of their tiny creations has been threatened with the decision by the N.A.A. Contest Board to set up certain requirements for the 1939 and following seasons. A complete set of engineering drawings and technical data must be approved before construction of the ship is authorized. Following this, a close examination of the complete structure is necessary to be followed by landing and take-off speed tests. "Aviation's Dare-devil Scientists," the only group of adventurous and progressive builders in the entire world are now in the path of the regimentation dreadnaught. Fewer crashes and greater safety of these buzzing bees will be insured but something of the thrill of testing and proving untried designs will be gone. And we might add: a fair notch of speed.

According to the District Intelligence Officer of the Eleventh Naval District, San Diego, the Navy's Stearman-Hammond JH-1 was NOT shot down in a Naval anti-aircraft gun practice as was reported by scandalmongers. Such activities are too absurd for comment and aviation writers this nation over should deny any amount of common sense by releasing such ridiculous statements.

Not exhibited and still on the confidential list is France's Breguet 690 twin-engine bomber. Housed in the new-type cone-cowlings are two Hispano-Suiza 14 AB double-row radials developing 680 horsepower. Within the narrow hull are seated a pilot, rear-gunner and a photographer in the belly. In the nose are two 20 millimeter machine-cannons and machine-guns are provided for the rear gunner. The photographer-officer is located in a glass enclosure similar to our North American 0-47. The engine nacelles project past the wing trailing edge and house the retracted landing gear in their after-portions. Twin tails and special high-lift flaps and slots are provided. At 12,300 feet the Breguet 690 does 298 miles per hour. With two Gnome-Rhone 14-Mars double-row radials the 690 is capable of 302 miles per hour at 16,500 feet. Wing span is 50 feet, length is 32 feet and the ship weighs 6,820 pounds. It climbs to 13,000 feet in 9 minutes and 30 seconds.

Latest Caproni design to issue from Italy is the Ca. 135, twin-engine high-speed bomber powered by two Fiat A.80 twin-row radials of over one thousand horsepower each at 13,500 feet. The ship is large and brutish, resembling somewhat our Lockheed 14. Implications for two forward gunners are provided in the nose, each handling a single machine gun. Additional gun stations are on the upper fuselage and under the belly. Landing gear is retractable into the motor nacelles and the ship is claimed capable of 290 miles per hour.

Production models of the thirteen Bell XFM-1 multi-gun fighters ordered for our Army Air Corps will vary somewhat from the experimental prototype, principally in armament. The cramped and ineffective quarters of the rear gunner have now been redesigned with a single gun on the back of the hull and another one firing through an implantation in the belly. In addition, there will be a heavy aerial cannon mounted in a revolving

(Continued on page 28)



"BODY BY FISHER" (MORAL: DON'T FORGET TIMER)

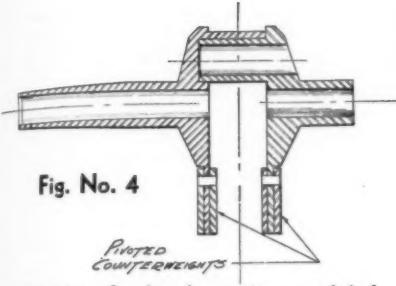


Fig. No. 4

Example of aircraft engine crankshaft showing how pivoted counterweights are employed to damp out vibration on radial engine crankshafts

THE effect of friction may be considered as a very pertinent part of the science of aerodynamics. Many means and methods have been invented to overcome the retarding characteristics of materials which lie in contact with one another. Liquids and gases present friction in molecular form, while solids present friction through contact. Friction may have its beneficial uses as well as detrimental effects. It is the function of engineering design to incorporate the property of friction in beneficial capacity where necessary and to eliminate it where it contributes excessive retarding action.

Friction is defined as the resistance or the opposition of two surfaces which lie in close contact with each other to any movement of these surfaces while in contact with each other. There are two kinds of friction; classified as static friction and kinetic friction. This in short means that friction, while never tending to aid the movement of a body, does not exhibit such a degree of resistance when the surfaces are moving. This is so because kinetic or moving friction is substantially less than static friction. A good example of static friction is presented by the conventional airplane tail skid which digs into the turf of the airport when the airplane is at rest. A representative example of rolling friction is incorporated in the bearings of the wheels of the landing gear of an airplane when the airplane is taxiing in from a previous landing or in the act of taking off. The thrust bearing of a radial engine is suggested as another example where rolling friction is encountered.

Frictional forces are governed in theory by a set of laws. These laws predicate the phenomena of friction.

1. The friction which exists between two sliding surfaces is assumed to be approximately independent of velocity.

2. When the force which acts perpendicular to the surface remains the same, the friction existing between the two surfaces does not entirely depend upon the area of contact. This is approximately true.

3. The necessary force which is required to overcome the friction between two surfaces in contact is proportional to the total force or the weight which presses one surface against the other.

4. The force of friction is greater at the start than after a body has been set in motion. (This may be said to be the result of the inertia of the body.)

The various phenomena which govern the property of friction can be determined by an expression known as the Coefficient

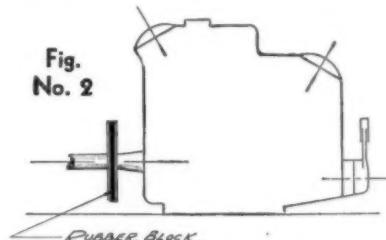
THE PHYSICS OF THE AIRPLANE

Friction and How It Is Reduced to a Minimum By the Careful Designing of Each Moving Part

By LT. JAMES EAMES and WILLIS L. NYE

Article No. 8

of Friction. When the design of a landing gear is undertaken, it is very essential to determine just what is the coefficient of friction existing in the bearings. From the determination of this value, it is possible



Rubber friction clutch for an aircraft engine magneto

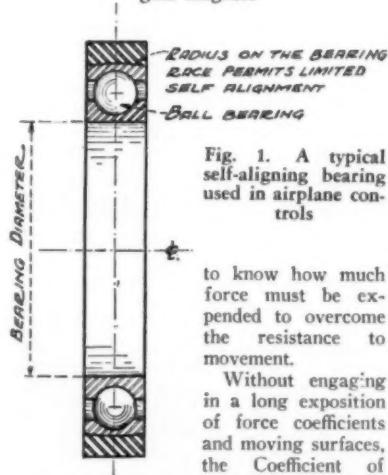


Fig. 1. A typical self-aligning bearing used in airplane controls

to know how much force must be expended to overcome the resistance to movement.

Without engaging in a long exposition of force coefficients and moving surfaces, the Coefficient of Friction is defined as

the quantity which is obtained by dividing the force of friction by the force acting perpendicular to the surfaces in immediate contact. This value is constant for various materials or combination of materials. This constant is a function of the surface layer of the materials in question. In equational form this coefficient is expressed: Coefficient of Friction =

$$\frac{\text{Force of Friction}}{\text{Force pressing bodies together}} = \frac{F}{P}$$

The coefficient of friction is measured in a laboratory by using a spring balance. The spring balance indicates the force which is necessary to drag a body along a flat surface with uniform velocity. This

value is then divided by the weight of the body. The spring balance shows the force which is equivalent to the force of friction. For example:

An airplane which weighs 2,500 pounds is at rest upon the concrete apron in front of the hangar. The necessary force which is required to taxi the airplane along the apron at a moderate velocity is 250 pounds. What is the coefficient of friction which exists between the airplane and the apron?

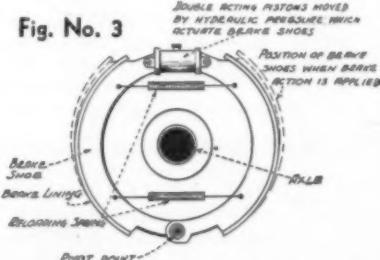
$$\text{Coefficient of Friction} = \frac{\text{Force equivalent to friction}}{\text{Force pressing bodies together}} = \frac{250}{2500} = .10$$

It is to be noted that the force which is required to move the airplane is equivalent to the friction and that the weight is equal to the force pressing the two surfaces together. In modern airplane design practice applicable to conventional landing gear design, a coefficient of friction not greater than .15 is allowed.

In good engineering practice, the distressing characteristics of sliding friction are overcome by the substitution wherever possible of rolling friction. Rolling friction is obtained by the incorporation at points of friction by roller bearings or ball bearings. The use of these bearings facilitates smooth, even movement and executes the same with a lower force equivalent of friction. As an example, roller bearings are now part of the landing gear of all modern airplanes in place of the obsolete type of bronze bushing. This is a typical example to show how rolling friction has been substituted in place of sliding friction with attendant good results and an improvement in efficiency. This permits an improvement in taxiing characteristics and the rolling characteristics. In the interest of efficiency, roller bearings are used wherever they are practicable in the moving components of air-

(Continued on page 58)

Fig. No. 3



An example of a mechanical friction device —The hydraulic brake as used on the landing gear of an airplane

Flash News

(Continued from page 26)

turret just behind the pilot-radio operator cabins. Work is now under way on the first of these new designs and their initial appearance is expected shortly.

Edwin P. Reynolds of the Consolidated Aircraft engineering staff recently returned from Russia, where he has remained for two years as project engineer on the Russian-built patrol ships of the PBY type now being built under license. In an interview he stated that more than one hundred ships had been completed at the time of his departure. They vary a great deal from their American prototypes both in structure and outline due to a frustrating lack of detailed manufacturing equipment. Engines are Russian built Wright "Cyclones" and top speed will be considerably less than our PBY-2, 3, 4 Navy Patrol-Bombers. Most of the ships' good points and fineness of outline has been lost, he declared. Both Douglas DF Flying Boats and Vultee Attack planes are under construction, he further stated.

Germany is now involved in the construction of a vast fleet of the venomous "Undersee" boats which wreaked such havoc in the last great world conflagration.

But this time new fangs have been added to the crafts for a new-type known as the "Undersee-Flugscraft" has been designed which will carry two small seaplanes within their hulls. They will be heavily armed. Further advance in the reincarnation of the German Imperial Naval Fleet was exemplified by the launching of the monster aircraft carrier "Graf Zeppelin" at Kiel a few weeks ago.

President Robert Gross of Lockheed has just returned from Washington, D.C., with a promise-order for their very much hush-hush fighter announced exclusively in these columns two months ago. Never before has such a military ship enjoyed the secrecy pervading this creation but when more complete news leaks out, FLASH NEWS guarantees further exclusive scoop coverage.

The venerable Gee Bee "Q.E.D." which unceremoniously dropped George Armitage into a mid-continent pasture in the 1938 Bendix Ayr Race, has just vindicated itself in a record-breaking 6 hours and 34 minutes dash from Los Angeles to Mexico City. Beating the late Amelia Earhart's former record by more than an hour, Captain Francis Sarabia, Mexico's premier pilot, required the entire field to lift his 400 gallon-load into the air on the wings of the "Conquistadore del Cielo." Further records will be his target.

Our High Revs and Clogged Carburetors Department:

High Revs to L. V. Kerber in his new post as Lockheed's representative in Washington, D.C. Sales, factory representation and Congressional lobbying will be his new duties following his resignation from the Bureau of Air Commerce as its Information Chief. We owe Mr. Kerber a great vote of thanks for his kind cooperation in our tremendous task of news-getting undertaken for these columns and his interest and sympathy have been

of invaluable assistance to us in the past few years.

Clogged Carburetors to those pseudo-patriots of the aviation writing fraternity who have so vociferously clamored the emptiness of Naziland's military coffers. For months now their pens have been busy with sheer propagandist intentions and self-esteem rejuvenation in their near-sighted condemnations of Herr Hitler's aerial re-armament. FLASH NEWS wants only the irrefragable facts, unvarnished, original and true and such is the quality of our columns. That Germany's fearsome fleet of NINE THOUSAND fighting planes all manned by capable pilots should have been ignored and rebuked stamps them as totally lacking in honest efforts towards the truth and methods of obtaining it. May we voice our irate accusations along with the army of others that their work is valueless when carefully scrutinized through the lens of honest factuality.

Latest method of pervading death comes from Germany, whose navy boasts a squadron of mine laying aircraft. The mines are dropped into the water from low altitudes by fast-flying fighting planes which are thus able to spread a net of instantaneous destruction in the path of approaching enemy naval vessels. Latest German Naval Aviation torpedo contains 396 pounds of novite, said to be the most deadly explosive known to warfare, with a hundred times the disintegrating power of T.N.T.

Bids for the construction of our navy's seventh aircraft carrier, the "Hornet," were invited recently and construction will soon be under way. It will be of twenty-thousand tons displacement, or about the same size as our latest additions: the "Yorktown" and "Enterprise" which are now on maneuvers with the fleet. A smaller (14,700 tons) carrier, the "Wasp," is now under construction at Fore River, Massachusetts. The United States leads the world in built and building aircraft carriers.

Dropping vertically at the dizzy rate of 575 miles per hour (845 feet each SECOND!), H. Lloyd Child, Curtiss-Wright test pilot broke all known speed records for any vehicle and thus traveled faster than any known human being. The ship was a standard Curtis "Hawk" type 75, of which two hundred, with negotiations for 350 more, are being built for the French Air Force. Needless to say, his pull-out was leisure and prolonged and it was in no manner a strength test of the 75. Child stated he felt no ill effects or even realized the tremendous speed he was traveling until his airspeed indicator moved beyond the range of the instrument and off the recording graph!

Recurrence of an old international problem loomed recently when Poland sent a request to Uncle Sam for two hundred thousand cubic feet of helium. This time, however, it is intended only for a stratospheric balloon flight in an attempt on the Anderson-Stevens' world's altitude record of 72,550 feet which was, however, made with the use of the lighter hydrogen gas. Thus, the National Munitions Control Board must suffer headaches either way it turns in the light of

its recent refusal to a similar request from Germany.

The world's first regular air mail aero roof-top service will soon go into operation with the award of a contract from the Post Office Department to Eastern Airlines for a service between the Philadelphia Post Office roof-top, which has been especially constructed, and the Camden, New Jersey Airport. Several important hours can thus be saved in the handling of air-mail between the landing field and the post office and more such routes are in prospect. Transcontinental and Western Air is now experimenting with its Kellet KD-1 wingless design and will undoubtedly bid on future contracts. The State Department is investigating reports that fifty Martin Bombers, assertedly constructed for the Turkish Air Force, were re-routed to Loyalist Spain by two officials of the Turkish Foreign Ministry. Unfortunately, the "corpus delicti," so necessary to such an investigation, have disappeared (all fifty of them) in the recent frenzied and bloody fighting during the siege and fall of Barcelona.

A potent weapon of war was recently flown to Wright Field via Southern California in a five-thousand-mile experimental test flight. It is the Boeing LB-17A, secret stratosphere adaption of the popular four-engine twenty-two ton bomber. The pressure cabin houses nine men and four two-thousand horsepower engines have been supercharged to the limit. On the first fifteen hundred mile Seattle-Los Angeles leg of the flight the ship is reported to have attained a speed of 425 miles per hour at the twenty-two thousand foot level. Further experiments are now under way. The five gunners, forced to operate in the unpressurized turrets, are equipped with special head and face masks for oxygen.

Miss Inez Gibson, petit but energetic operator of a flying service at Burbank, California's Union Air Terminal, is a cogent dark horse in this year's Bendix Transcontinental Dash. She has recently purchased a very, very special adaption of the Douglas (nee Northrop) A-17A, whose long range and high cruising speed should make her a young lady to be reckoned with. Mrs. Jacqueline Cochrane Odlum had best look to her laurels!

C. E. (Ab) Powell, Vultee employee and one of the nation's best known test pilots, was killed along with Lieut. Jose Grisbul when their Vultee Attack monoplane crashed and caught fire during an instruction flight over Andaray Military Airdrome near Rio de Janeiro, Brazil. This ship was one of 26 new Vultee light bombers delivered to the Brazilian Air Force recently.

Two Boeing B-17 four-engine bombers with expert doctors, nurses and valuable medical supplies aboard acted as fast-flying mercy ships on a speed dash from Panama to Santiago, Chile, in the holocaustic earthquake there last January. Hitting three hundred miles per hour on some stretches, the giant Mercuries of Mercy averaged 240 miles per hour for the two thousand mile flight and played a vast part in the prevention of a serious

(Continued on page 30)

HYBRID AIRPLANE CONTEST

WINNERS

News for Which You Have Been Waiting—
The Presentation That Won First Place
and Winners of the Other Awards

WHILE Democrats, Republicans, Socialists and Communists the country over were tabulating the results of the recent elections, we of MODEL AIRPLANE NEWS were equally busy tabulating the results of the Hybrid Airplane Contest.

A view of the Contest Editors pouring over the numerous entry coupons would look much like that of political leaders at "party headquarters" on election night. Open collars, rolled-up sleeves, steaming hot coffee and paper-strewed floors all lent to the atmosphere that permits this comparison. Tabulation of results received from no less than 204 contestants required the correction of approximately 2040 coupons with a total of 8,160 answers that had to be examined.

From this overwhelming avalanche of entries, 29 money winners, ranging from 15 to 30 years of age, were selected.

First award was won by FRANK FONG of 1250 Robert Street, Hillside, N.J., with a perfect score of forty correct answers. Not only were Frank's answers letter perfect, but the care exercised in the preparation of his answer sheets merited their publication in the magazine.

Although neatness played a secondary role in the selection of the winners, the Contest Editors are indeed grateful to the many contestants who through this simplified the tedious task of examining the many answer sheets.

Winners of the contest are as follows:

First place.....Ten dollars

FRANK FONG, 1250 Robert Street, Hillside, N.J., age 19 years.

Second place.....Six dollars

P. C. BOISSEAU, 204 Winona Ave., Wasena, Roanoke, Va., age 18 years.

JOHN LEE CHAPMAN, Belgrave Road, Catonsville, Md., age 16 years.

Third place.....Four dollars

GORDON S. WILLIAMS, 5740 36 Ave. N.E., Seattle, Wash., age 22 years.

Fourth place.....Three dollars

WILLIAM J. CHAPMAN, Belgrave Road, Catonsville, Md., age 18 years.

CHARLES CHILVERS, 2821 East 4th Street, Long Beach, Calif., age 18 years.

Fifth place.....Two dollars

JOHN T. ALFIREVIC, 3000 South Homan Ave., Chicago, Ill., age 21 years.

DAVID E. HAMBSCH, 5503 Gwynn Oak Ave., Baltimore, Md., age 17 years.

ERNEST MIKUS, 501 South Washington Ave., Dunellen, N.J., age 17 years.

Sixth place.....One dollar

WALTER DINTEMAN, Route No. 2, Martinsburg, W. Va., age 15 years.

BOB FRIDELL, 2316 Warren Ave., (Continued on page 30)

By NICK LIMBER

ANSWERS TO HYBRID AIRPLANE CONTEST

SUBMITTED BY

**FRANK FONG 10 YRS.
1250 ROBERT STREET
HILLSIDE, N.J.**

• **DIAGRAM No. 3A.**

(FUSELAGE) CURTISS "HAWK" 75 (PURSUIT FIGHTER)
(WING) PASPED SKYLARK ✓
(RUDDER) FIAT CR-30 (FIGHTER)
(ELEVATORS) CURTISS "HAWK" (FIGHTER 1936)

• **DIAGRAM No. 2A.**

(FUSELAGE) CHANCE VOUGHT-SBU-1 ✓
(WING) STEARMAN 73 (NAVAL TRAINING)
(RUDDER) NORTH AMERICAN NA-16-4 (ADVANCED TRAINER)
(ELEVATORS) CONSOLIDATED A-11 ✓

• **DIAGRAM No. 4A.**

(FUSELAGE) NORTH AMERICAN NA-16-4 (ADVANCED TRAINER)
(WING) CONSOLIDATED A-11 ✓
(RUDDER) CHANCE VOUGHT-SBU-1 ✓
(ELEVATORS) NORTH AMERICAN NA-16-4 (ADVANCED TRAINER)

ANSWERS TO HYBRID AIRPLANE CONTEST No. 2

SUBMITTED BY

**FRANK FONG age, 19
1250 ROBERT STREET
HILLSIDE, NEW JERSEY**

• **(DIAGRAM #1B) 12**

FUSELAGE • GRUMMAN F2F-1 ✓
WING • GRUMMAN SF-2 ✓
RUDDER • GRUMMAN SF-2 ✓
ELEVATORS • CURTISS XF13C-1 ✓

• **(DIAGRAM #2B)**

FUSELAGE • HAWKER 1936 FIGHTER ✓
WING • CURTISS P-36-A ✓
RUDDER • BRISTOL BULLDOG MARK II
ELEVATORS • LOIRE-NIEUPORT 250

• **(DIAGRAM #3B)**

FUSELAGE • NORTHROP A-17A ✓
WING • CURTISS HAWK 75 ✓
RUDDER • RYAN S-C ✓
ELEVATORS • RYAN S-C

ANSWERS TO HYBRID AIRPLANE
CONTEST No. 3.

SUBMITTED BY

FRANK FONG age, 19
1250 ROBERT STREET, HILLSIDE, N.J.

• **DIAGRAM No. 1 C**

FUSELAGE • TURNER RACER ✓
WING • LOIRE "46" ✓
RUDDER • TURNER RACER ✓
ELEVATORS • AERONCA "K".

• **DIAGRAM No. 2 C**

FUSELAGE • DOUGLAS XTBD-1 ✓
WING • DOUGLAS XTBD-1 ✓
RUDDER • DOUGLAS XTBD-1 ✓
ELEVATORS • BREGUET 462-B4

• **DIAGRAM No. 3 C**

FUSELAGE • AIRSPED "COURIER"
WING • BELLanca 14-9 "JUNIOR"
RUDDER • AIRSPED "COURIER"
ELEVATORS • CURTISS XP-37

• **DIAGRAM No. 4 C**

FUSELAGE • AIRSPED "ENVoy"
WING • LOCKHEED "ELECTRA"
RUDDER • AIRSPED "ENVoy"
ELEVATORS • CURTISS A-10 (ATTACK)

**Hybrid Airplane Contest Winners**

(Continued from previous page)

Seattle, Wash., age 17 years.

LLOYD W. LEE, 909 East Capitol Street, Washington, D.C., age 17 years.

RICHARD VAJNER, 3673 East 149 Street, Cleveland, Ohio, age 18 years.

Seventh place.....One dollar

FRANKLIN GEDLEIN, 526 East Utica Street, Buffalo, N.Y., age 19 years.

RAY SIEMANKOWSKI, 220 Gates Street, Sloan, N.Y., age 18 years.

MILAN A. STOCKING, 669 Patterson Ave., Akron, Ohio, age 20 years.

Eighth place.....One dollar

EDWARD J. BROUNK, 1331 South 15th Place, Milwaukee, Wisc., age 24 years.

ARTHUR BUJNOWSKI, 36-52 35th Street, Astoria, Long Island City, N.Y., age 15 years.

J. ROY CURRIE, 50 Bland Street, Halifax, N.S., Canada, age 17 years.

EDWIN C. DAVIS, 1201 Beacon Street, East Chicago, Ind., age 30 years.

JOHN TYSON HARDIN, 811 Jefferson Street, Macon, Miss., age 18 years.

BUZZ MITCHELL, 3490 Harding Avenue, Detroit, Mich., age 19 years.

Ninth place.....One dollar

I. M. BAILEY, American Airlines, Bendix Airport, South Bend, Ind., age 24 years.

PETER BOWERS, Box 357, Los Altos, Calif., age 20 years.

OSCAR A. SANNE, 40 Woodcrest Ave., Stratford, Conn., age 17 years.

MICHAEL L. SMITH, 2645 Roselle Street, Jacksonville, Fla., age 22 years.

EARL STAHL, 810 Suter Street, Johnstown, Penna., age 20 years.

Tenth place.....One dollar

FRED EHMANN, 10-10 Forest Ave.,

Ridgewood, N.Y., age 18 years.

HENRY HUGOS, 1111 7th Ave., North Great Falls, Mont., age 23 years.

Entry coupons were received not only from the various corners of the United States but from Canada, Mexico, Cuba, and the Philippines. It was of interest to note that several of the contestants were young ladies and that most of these did remarkably well although they were not awarded prizes. The average percentage for all contestants was remarkably high, even more so than anticipated by the judges.

The enthusiastic reports concerning the contest were very gratifying and the cooperation of the contestants in complying with the regulations appreciated.

By way of post mortem, the airplanes used to design the hybrid ships are listed below:

Chance Vought SBU-1, Stearman 73 trainer, North American NA-16-4, Consolidated A-11, Curtiss Hawk 75, Curtiss Hawk III C, Pasped Skylark, Fiat CR-30, Hawker 1936 Fighter, Curtiss P-36-A, Bristol Bulldog Mark IIA, Loire-Nieuport 250, Grumman F2F-1, Grumman SF-2, Curtiss XF13C-1, Northrop A-17-A, Ryan S-C, Roscoe Turner's Racer, Loire 46, Aeronca "K," Airspeed Courier, Airspeed Envoy, Bellanca 14-9 Junior, Curtiss XP-37, Lockheed Electra, Curtiss A-18 Attack, Breguet 462-B4, Douglas XTBD-1.

Flash News

(Continued from page 28)

epidemic in the debris-strewn city of homeless victims.

The possibility that the fighting pilot's greatest fear: exploding and burning gasoline tanks, has at last been eliminated comes from famed Balkan war flyer, Assen Jordanoff; who announces the perfection of a frozen aviation gasoline. His apparatus consists of cooling coils wrapped about the fuel tanks into which

is injected a combination of dry ice and alcohol to hold the temperature down to one hundred degrees below zero. En route to the engine, the gasoline is heated and prepared for injection into the cylinders as a spray. Lighted matches, much less enemy bullets or crashes, will not ignite the frozen, yet still liquid, petrol.

After claiming eighty thousand square miles of Antarctic territory for the United States, explored from the heated confines of his luxurious Northrop "Delta" monoplane, one of the world's last explorers, Sir Hubert Wilkins, brought his Norwegian supply motorship Wyatt Earp (named, oddly enough, for a famous gun-totin' Kansas Sheriff of the 60's) into dock at Melbourne, Australia, late in January. He is the last of the romantic band of intrepid explorers for the simple reason that there is very, very little land left to explore!

Clipper No. 17, Boeing's first model 314, glided into a graceful landing on San Francisco Bay and drifted into the first official docking at Treasure Island's million dollar future airport. The first of six, (four have been completed up to date) it will undergo one hundred hours of experimental test flights from Oakland under simulated Pacific Ocean flying conditions before the first crossing is made late in February. Pan American Airways, unable to undertake the outlay of a cool two-and-a-half million dollars for the sextette of giant airliners, has formed an equipment trust in which the stockholders will actually buy the planes and PAA will purchase them on a "pay as you go" basis. Clipper No. 18 is now en route to Miami for tests under simulated Atlantic flying conditions which, obviously, are vastly different from Pacific operations.

—AMERICA FIRST IN THE AIR—

Write and tell us what type of articles you wish to see in MODEL AIRPLANE NEWS.

36 ISSUES

Imagine getting 36 issues of your favorite magazines for a fraction over 5¢ each! That's the monthly cost of each magazine in this amazing BARGAIN offer. MODEL AIRPLANE NEWS—the handbook for all model airplane builders—every month for a whole year—and OPEN ROAD FOR BOYS, every month for 2 whole years—for only \$2.00. Truly this is an offer you can't afford to pass up.

In OPEN ROAD FOR BOYS you'll get thrilling stories of adventure and mystery, of baseball, football, hockey, and all other popular sports, with instructive articles by famous players and coaches; stories and articles on Camping and Hiking; sparkling tales from

**MODEL AIRPLANE NEWS FOR 1 YEAR
OPEN ROAD FOR BOYS FOR 2 YEARS****5½¢ PER COPY**

every part of the world and from Pole to Pole; from the Old West and the Far East; stories that will interest and fascinate you from start to finish. Mystery, Adventure, Comedy, School Stories, Funny Stories and others. Also departments devoted to Stamps, Cartoon Contests, Jokes and the Pioneers' Club conducted by Deep-river Jim and the Campfire Chief. If you've never read OPEN ROAD FOR BOYS you have a real treat coming—and this is your opportunity to get acquainted on this SPECIAL COMBINATION offer.

MAIL THIS COUPON NOW!**You Save \$2.80**

FILL IN THIS COUPON AND SEND IT OFF RIGHT AWAY!
Model Airplane News
551 Fifth Ave., New York

Yes, Sir! I want those 36 Magazines (12 Copies of MODEL AIRPLANE NEWS and 24 Copies of OPEN ROAD FOR BOYS). Here is my \$2.00.

Name..... Age.....

Address.....

City..... State.....

Magazines may be sent to different addresses.
This offer good in the United States and its Possessions; also Canada, Cuba, Mexico and Panama. All other countries \$4.00.



Louis Meyer

CHAMPION RACE DRIVER OF ALL TIME

..... builds
and races the
Speed Demon

Louis Meyer, three times AAA Champion and the only three time winner at Indianapolis, winning first place in 1928, 1933 and again in 1936, says this about racing:

"Almost every day I am busy building and testing new motors, superchargers, streamlining and many other ideas to win the big 500 mile event at Indianapolis."

"Recently I have found a new racing sport — building and running the Speed Demon race car. It is racing in which everyone can participate and enjoy."

"Authentic in design and proportion I have found the Speed Demon a duplicate in miniature of a typical Indianapolis one man car and is capable of attaining and standing up at speeds in excess of 50 M. P. H."

"Despite the small size of the 20" Speed Demon I was amazed at the simple processes of assembly. From the kit of manufactured parts it required only a few spare hours and little more than a screw driver to complete my racer. This is in direct contrast to the requirements in special tools plus a full year's work to complete my Indianapolis winners."

BUNCH MODEL AIRPLANE CO., 5009 SOUTH HOOVER ST., LOS ANGELES, CALIF.

SEND FOR A SPEED DEMON TODAY
DISCOVER THE THRILL OF MIDGET CAR RACING



LOUIS MEYER SHOWS RACING METHOD

1. A special race track is not necessary. Louis Meyer "guns up" and races on the ramp to his garage. With the engine "revving up" and clutch engaged the Speed Demon is set off with a push forward. The cord attached to the frame is let out to guide the car from the center of the circle.

Two or more may race Speed Demons together. Extra line is let out to pass on the outside. The line is passed over the head of the overtaken man.

Louis Meyer's fastest time with the Speed Demon is 50 M. P. H. which compares favorably with his fastest qualifying time at Indianapolis, 124 miles per hour. He says: "I am delighted with the scale speed of my new Speed Demon."

2. Refueling between runs takes but a few seconds. A 1½ oz. fuel tank capacity permits 50 laps or more. The removable hood allows access to the motor, clutch and flywheel to start the engine.

The front end is held off the ground with the front driving wheels engaged as the engine is warmed up and adjusted. The Speed Demon can be controlled running in a circle varying from 20 to 100 feet in diameter.

Wheels are the drop-center type of one piece aluminum. Tires are fully pneumatic and perfectly balanced with the weight of the inflating valve counter-balanced.



USE COUPON BELOW

Secure immediate delivery from the Bunch factory. The Speed Demon kit is guaranteed complete with all parts ready to assemble. Engine and flywheel extra. SPEEDWAY engine for the Speed Demon is advertised elsewhere in this magazine.

Bunch Model Airplane Co.,
5009 So. Hoover St.,
Los Angeles, Calif.

Enclosed find postal money order. Please rush me:

SPEED DEMON plans (\$1.00)

Complete SPEED DEMON Race Car Kit

Name _____
Street _____
City _____ State _____

\$16.50
COMPLETE
LESS MOTOR ONLY



Ask Your Dealer For

FOR HEAVY



GAS MODELS

Colors: Natural, Red, Yellow, Blue and Green—all brilliant

Ref. from Phila.: "We have run tests on Star Brand AMERICAN BAMBOO PAPERS and find them far superior to any that come from Japan. Panels covered with the paper have been tested for resistance to punctures, with falling lead shots. In every case we had to drop the weights twice as far on the AMERICAN paper as on the Japanese. Furthermore, the new paper presents a smoother surface, dopes nicely and does not have objectionable fibers raised above the surface."



PROPELLERS

The following types in stock:

HELICAL
STANDARD
BROAD BLADE
STEEL TYPE



MINIATURE CELLULOID MOTORS

4 sizes: 1 1/2" 2" 2 1/2" 3"
Another Japanese Import

These lightweight motors have been designed to our specifications. Even small as the original radial engine has been accurately reproduced even to the cowls at the front. They are a distinct improvement over any other dummy motor. At Whitfield's low price, they can be easily included in every flying model kit.

We Pay Shipping Charges

WHITFIELD PAPER WORKS

76 VARICK ST. NEW YORK CITY

Established 1888

A Word to The Wise

(Continued from page 11)

when the rubber tightens up . . . also check their craft to make certain the propeller is functioning accordin' to Hoyle . . . that washers are being used on the prop shaft.

ANSWER-FOR-THOSE-IN-THE-KNOW: Anybody can construct a model, but not everybody is able to adjust one well. How true—you can discern this even at a National Meet.

Ten-Second Lecture Entitled "Take It Easy, Young Fellow." Don't start your building career with gas jobs! No, no—graduate into gas from rubber-power . . . it's a lot less expensive method of learning the "1001 Tricks of Model Airplane Building!" . . . take time with your construction and at meets watch the other, more expert flyers.

Covering tips: Run the grain of the paper parallel with the leading and trailing edges of the wings on outdoor crates, scale models and whenever it need be shrunk with water and/or doped to produce a smooth, taut covering. On the undoped surfaces of indoor jobs, the paper is applied with the grain parallel to the wing ribs . . . under actual flying conditions (in a warm armory, for instance) when heat shrinks the covering slightly, the dihedral increases instead of the wing twisting (washing in or out) . . .

After all: as somebody once said, the best method of learning is by doing . . . so urge the tyro to build regularly and not be content with only one or two ships in his repertoire . . . encourage beginners by holding events especially for them . . . colorful, inexpensive ribbons will serve as fine prizes . . . and a grand prize at the end of a series of meets would be an expertly-constructed model box.

See you next month with more dope 'n dots!

How To Make Your Model Behave

(Continued from page 15)

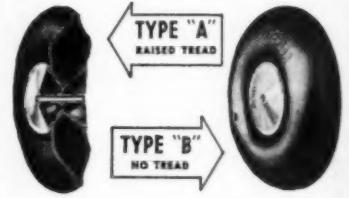
produce, as no correction can be made after the plane starts on its flight.

The problem for the model builder therefore "boils down" to two considerations: First, the general arrangement or adjustment of surfaces and balance a plane of any particular design should have. Second, how the character of the plane's flight may be changed at will by modifying these general arrangements of surfaces and weights.

A short while ago a letter was received from an enthusiastic but puzzled model builder. He said,

"Can you help me? I have built a model from a construction kit and have followed the directions closely. The plane afforded a very realistic appearance when it was completed and therefore I did not doubt that it would fly beautifully. However, I have not been able to get it to fly properly: I cannot get it to do what I want it to do. In fact it never has made a really good flight. It will not climb, glide or land the way it should. What can I do to make it fly like some of the planes that make records?"

MARPELL STREAMLINES IN 2 TYPES



Get the Fastest gas model wheel money can buy. You pay only a trifle more, yet Marpells overcome the defects of wheels made by rubber toy methods. Now a choice of two types in 3 1/2" and 4 1/2" diameters. Type A, with raised tread prevents ground looping, permits safe landings in wind. Type B, with no tread for those who prefer newest, realistic streamline appearance.

Patented Marpell hub of 2450 dual is heat treated and highly polished with bronze bearing for 1/4" axle. "Air check" inflation valve will not leak. Inflator furnished.

Order direct from this ad or see your local dealer. Be one of the hundreds who have found Marpells flawless in design and material.

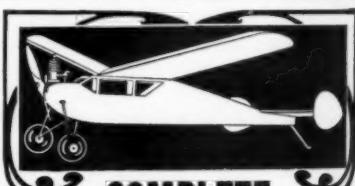
Tell Wheel Included Specify Type A or B; 3 1/2" or 4 1/2" diameter. California buyers add 6¢ sales tax. For Air delivery add 5¢.

MARPELL SUPERIOR PRODUCTS CO.
4406 Victoria Ave.
Los Angeles, Calif.

\$2.50

Dealers
write for information.Note To The 1500
C. C. C. Camps

Who Will Receive a Copy of This Issue: Your comments and suggestions will be appreciated.
—Editor.

COMPLETE
KIT and BROWN JR. MOTOR
\$12.45 P. P.

60 inch span. Wt. Approx. 3 lbs. Kit contains absolutely completed ribs, spars, leading edge, fuselage bulkhead, motor mount, stabilizer, rudder, tail cone and all hardware. Fuselage sides top and bottom, nose cone, rudder and wing tips semi-finished (cut on line and sand). Finished prop. Also ½ qt. dope, ½ pt. cement, silk, airwheels, booster connections, hook-up wire, ignition switch. Brown Jr. Motor, tank, oil and cond. Model is designed especially for Brown Motor whose extra power gives it a breath taking climb. We believe this has greater structural strength than any model on the market, and it will out fly anything in its class. Can easily be built in two evenings as kit is practically prefabricated. Send for bulletin.

Kit and motor..... \$12.45 P. P.
W. of Miss. add 25c. Outside U.S. add 10%
Same model, factory built, ready to fly \$19.50 F.O.B.
here. We have no dealers. You save. Money back
guaranteed.

PINEYHIRST AIRCRAFT
MAYS LANDING,
NEW JERSEY

The answer to this young man's hopes lies in knowing the correct adjustment of wing, stabilizer, fin and the proper position of the center of gravity of this particular model.

The first step in solving the problem is to determine the general character of the arrangement of these parts required for the type of model he wishes to fly. The second step is to determine the refinements of adjustment, or modifications, in the general arrangement necessary in the case of this particular airplane.

Undoubtedly many other model builders are puzzled on numerous occasions respecting the correct arrangement of the surfaces and weights of their models. Really the problem is an easy one to solve if one approaches it systematically. Therefore, let us undertake to outline the correct basis set-ups for models of various types, and then see how to make them perform in any particular manner by modifying slightly these general arrangements of surfaces and weights.

First of all, let us determine the type of flight that we wish our model to make. The object is duration. Therefore, at the start of the flight, the model should climb as steeply as possible without stalling. The steepness of the climb will depend upon the amount of power available. The greater the power, the greater the maximum ANGLE of climb will be. If possible, the model should continue to climb as long as the power lasts.

In rubber-powered planes the power delivered by the motor gradually diminishes as the motor unwinds. Therefore the angle of climb should become less and less as the power decreases. When the power "dies" completely the plane should assume the flattest angle of glide possible without zooming or stalling. If it glides steeply the duration of flight will be less than the possible maximum. If the model has a tendency to glide too flatly, it will "zoom" and stall periodically with an irretrievable loss of altitude at the end of each stall.

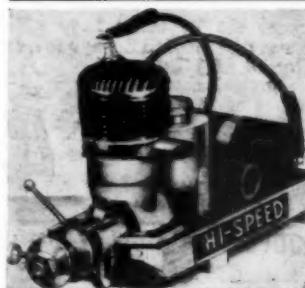
All types of planes could have the same arrangement and setting of surfaces if the point or reaction of the center of resistance was the same in all cases. In the case of high-wing models it is approximately coincident with the line of thrust or very slightly above it. The line of resistance of mid-wings is slightly below the line of the thrust; and is considerably below the line of thrust in the case of most low-wings.

In this discussion the terms "mid-wing," "low-wing," etc., are used in the sense of indicating the position of the wing relative to the line of thrust, and not necessarily in relation to the fuselage. A plane with the wing at the bottom edge of the fuselage and the line of thrust close to or on a line with the wing center section at the lower edge of the fuselage, is essentially a mid-wing in an aerodynamic sense. Structurally, it may be a low-wing, but here we are dealing with aerodynamic forces and the position of the structure in itself does not affect the basic arrangement of flight forces.

In the last but not least type of model, the "parasol," the line of resistance is well above the line of thrust.

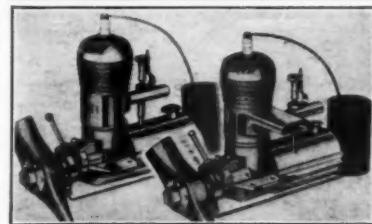
Thus the wing stabilizer and center of gravity must have a different set-up in the various types, due to the different position

SCIENTIFIC—Buy at "Headquarters" for Top Engine Values!



HI-SPEED ENGINE
1/7 H.P.—6,500 R.P.M.
Bare Weight 3 1/2 oz.
ONLY \$12.75 Postpaid
including propeller, oil, instruction manual and double guarantee.

OHLLSSON
Model "23"
Horsepower 1/7;
Stroke 1 1/2";
Bore 9/16";
Bare engine weight only 1 1/2 oz.;
Height 1 1/2";
Complete with coil, condenser, etc.
\$16.50
Postpaid



1939 BUNCH MOTORS

Specifications: All Bunch Engines full 1/4 h.p. 5,200 r.p.m.; 1/4 h.p. \$50.00. Full Bore 19/32". Stroke 19/32". Bare Weight 6 1/2 oz. Complete, ready to run, with coil, condenser, fuel tank and Champion spark plug.

MIGHTY-MIDGET Upright Assembled	\$ 9.50
MIGHTY-MIDGET Inverted Assembled	7.75
MIGHTY-MIDGET Inverted Kit.....	7.75
GWIN-AERO Upright Assembled	9.95
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FREE correct design propeller, S.A.E. 70 oil, and instruction manual and Scientific Double Guarantee.

BANTAM Specifications:

Bore 19/32". Stroke 19/32". Bare engine weight 2 1/2 oz. Speed range —500 to 10,000 R.P.M. Complete with prop, oil and double guarantee.

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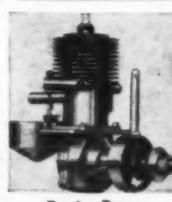


All motors carry the famous Scientific Double Guarantee. Assures you of 100% Satisfaction



BRAT ENGINE
Bore 9/16"; Stroke 5/8"; Height 3 1/4"; Weight 3 1/2 oz. Complete with coil, condenser, propeller, instructions, can do it.

\$16.50
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Forster Bros.
Bore 1 1/16"; stroke 1 1/16"; 2 piston rings, wt. 14 oz.
Model "B" Air cooled.
Model "C" Water cooled.
With Ball Bearing.....\$19.50
Model C Water Cooled.....\$19.75
Bronze same with Ball Bearing.....\$19.50
Price.....\$19.50
Complete motor including propeller, oil and double guarantee (no prop. with water cooled motor).....\$1.95
Propeller.....\$1.95



SYNCRO ACE Special ONLY \$9.95
Postpaid
Horsepower 1/5; Bore 5/16"; Stroke 1 1/16"; Speed up to 10,000 R.P.M. Complete with coil, condenser, oil, tru-pitch propeller and double guarantee.

Syncro Ace, Model "A." A high quality precision engine, \$13.75 complete, postpaid.



M & M MOTOR
Hr. 3 1/2"; 21/32"; Bore 1 1/2"; Stroke 1 1/2". A high quality precision engine. Comes complete with propeller, oil and double guarantee.

\$16.50
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BROWN Jr. MODEL D \$10 POSTPAID



7/8" Bore, Ht. 4 1/4", 1" Stroke, 1/2" H.P.

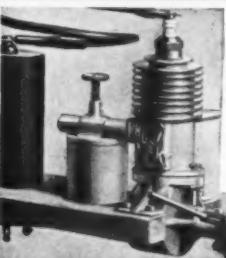
1200 to 10,000 R.P.M.

Weight, ready to run with gas, two batteries & propeller: 20 1/2 oz.



MODEL "B"
Long famous for power, smooth running, and high compression. Piston ground and honed to perfect fit. Highest quality gas engine obtainable.

\$21.50
Postpaid



HUSKY JUNIOR
5/8" bore, 5/8" stroke, complete weight 6 1/2 oz. Complete with coil, propeller, oil and double guarantee, postpaid.

\$12.50

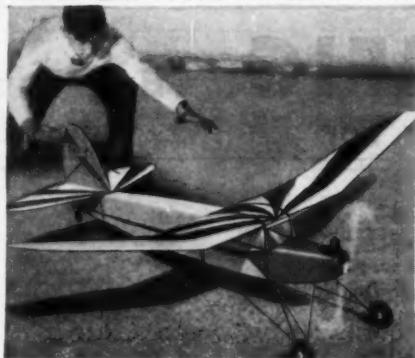
SCIENTIFIC MODEL AIRPLANE COMPANY "GAS MODEL HEADQUARTERS"

218-220 MA-4 MARKET STREET

In France: E. Kruger & Co., 9 Rue St. Sébastien, Paris
In England: Model Supply Stores, 4 Stewart St., Deansgate, Manchester
In South Africa: Yardley's, 33, Kerk St., Johannesburg

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A/S, Turku, Abo

RED ZEPHYR HOLDS CHAMPIONSHIP OF FRANCE



THE BIGGEST KIT VALUE EVER OFFERED



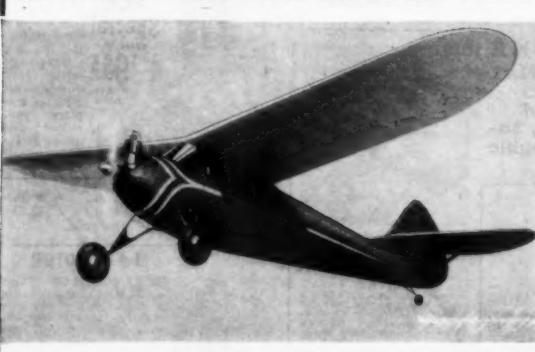
16 year old Raymond Levy of Paris, France, flew his Red Zephyr to a national record of 1 hour and 20 minutes, covering a distance of 25 miles.

\$4.95
ONLY
Postpaid
(less
weight
of
motor)

6 FT. WINGSPAN

With 3½" Pneumatic Rubber Wheels. \$5.95 postpaid.

The EAGLET—A POPULAR SMALL GAS MODEL



44" Wing—Length 32"
Flying weight 17 ozs.

Truly the Finest Midget Gas Job Offered to the Gas Model Builders Today.
DESIGNED FOR USE WITH MIDGET GAS ENGINES.

The trend in the size of gas models today is toward a thin wing surface to four feet wingspan and corresponding light weight. The "Eaglet" won 2nd and 3rd places at recent Philadelphia gas meet. Or At Your Dealers.

\$3.95
POSTPAID



33 Perry St.,
Belleville, N.J.

Gentlemen:
I am sending you a picture of my Eaglet model. This view shows it coming in to land with motor shut off. After the motor was shut off it glided for over 30 minutes.

This model sure was easy to build from the complete kit. I am sending it to headquarters for all my models.
Very truly yours,
Allen Bedford.

NEW SCIENTIFIC "COMMODORE"



COMMODORE DeLuxe Gas Model

Wingspan 6 feet
Overall length 50"
Wing Area 5.2 sq. ft.
Total weight with motor and ignition mounts 3½ lbs.
Airfoil section Gottingen 549
Glide Ratio 16 to 1
Rate of climb Approx. 700 ft. per min.

\$6.95
PRICES ARE POSTPAID
Complete
Less
Wheels
\$7.95

A GREAT ADVANCEMENT IN GAS MODEL DESIGN

The new Scientific Commodore gas model has been designed by the well known "Eaglet" gas model designer, Mr. Ben Shereshevsky. In this new model Mr. Shereshevsky has combined all his knowledge and efforts to build what we believe the finest gas model in America.

An inexpensive 1½ horsepower engine may be used. On many test flights the "Commodore" was powered very successfully with the Brown Jr. Model D engine. Other engines such as the Brown "S", Oblason, Midget Gwin, Dennymite, Syncro, or any other reliable make motor may be used with success.

KIT IS 100% COMPLETE, including highest quality sheet and strip balsa, fine steel wire, all metal fittings, ignition wire, large full size plans with explicit instructions, all necessary liquids, etc., etc.

MISS AMERICA GAS MODEL

NOW HOLDS
WORLD'S RECORD
WITH FLIGHT OF
40 SECONDS ON
27 SECOND MOTOR
RUN.

Word has just been received from N.A.C.A. Headquarters at Washington confirming this flight made by Mr. Phenix of Houston, Texas.

Kit is 100% complete with 3½" pneumatic wheels, 7 ft. wing; wt. (less motor) 2½ lbs. 22 min. on one oz. fuel; 18 to 1 glide.

\$7.50
P.P.



THE STREAMLINER

Wingspan 6 Ft. Wt. 2½ lbs. Length 43"

COMPLETE KIT with Ready-made balsa ribs, Stamped Metal nose cowling, liquids, all balsa cut to correct sizes, nuts, bolts, etc. All parts are self-aligning. Full size plans, 16 oz. of clear varnish, 1 oz. of shellac, 1 oz. of celluloid, 1 oz. of paper, etc.

Complete kit, less wheels, at your dealer or direct, only \$4.95 postpaid.

Complete kit, including a pair of 3½" pneumatic rubber air wheels, only \$5.95 postpaid.

SCIENTIFIC

SCIENTIFIC GAS MODEL SUPPLY

DIAMOND GAS MODEL PROPS

ROBOT TIMER

9"-10"-11"-12"-
13"-14"-15"-16"-
Everyone uses
pitch finely made
and perfectly balanced.

ANY SIZE ONLY

49¢
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DELUXE TRU-PITCH PROPELLERS

9"-5.60 13"-3.70
10"-6.00 14"-4.11
11"-6.50 15"-4.65
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WHAT SIZE PRO-
PELLER DOES
YOUR MOTOR RE-
QUIRE

Oblason Gold Seal
14". All Brown Motor
Special 14".
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ton 14". All Cyclone
13". Forster 12".
Phantom 12". Ban-
ton 10". Hi Speed
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Bee 9".
Brist 12".
M&M

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Gentlemen:
I am sending you a picture of my Eaglet model. This view shows it coming in to land with motor shut off. After the motor was shut off it glided for over 30 minutes.

This model sure

was easy to build

from the complete

kit. I am sending

it to headquarters for

all my models.

Very truly yours,

Allen Bedford.

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SCIENTIFIC LEADS!

J-I-T-T-E-R-B-U-G ENDURANCE MODEL



25" Wingspan—Length 20½"—Light Weight

FLIES OVER 1 MILE (6,000 feet)

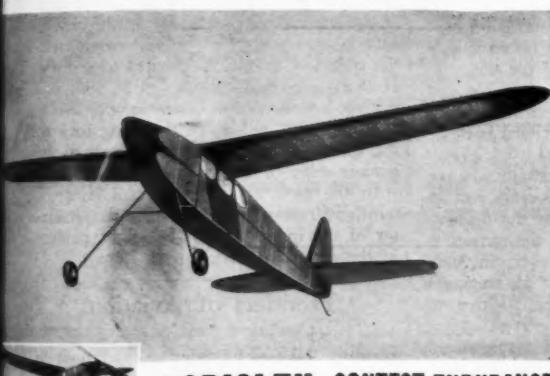
Another famous Flying Model originated and designed by Scientific. This trim, endurance model can easily fly one mile or more, and then gradually glide for a few feet, climb into the air again, and then gradually glide to a perfect 3-point landing! It is one of the most interesting planes you will ever build! Look at that shapey wing—detachable, too—that little cabin—streamlined, and graceful. The construction is simple and sturdy. "Clean" and long flights. The construction is simple and sturdy. Guaranteed.

Complete with all materials including streamline wheels and propeller, full size plans and explicit instructions.

ONLY

50¢
Postpaid at your dealer

and exceptionally low. Complete kit



"ORIOLE" CONTEST ENDURANCE MODEL

Flies 2 to 3 Miles: Overall Length 34"

So simple, even the beginner can complete the model in a day. This Model will clear the ground in a short take-off and climb with amazing speed. Every detail of the "Oriole" conforms with N. A. A. contest requirements.

Kit is 100% complete. Black and Orange color motif. All highest quality parts—strip balsa accurately cut to size; ribs, outlines, etc. clearly printed on sheet balsa, formed wire parts, 18" machine cut drilled balsa propeller, cement, rubber, colored tissue, ball bearing washer, spring steel landing gear wire, pair of streamlined wheels, liquids, full size plans with instructions.

THE BIGGEST KIT VALUE IN AMERICA TODAY!

WINGSPAN

\$1.00
Postpaid

At Your Dealer



Wingspan 24'
Length 15'
Flies ½ mile

GAS TYPE MODEL

Designed by Indoor Expert Carl Goldberg in miniature duplicate of his prize winning original which won second place at the "National," Detroit, 1937. Can be easily constructed in 4 or 5 hours. HAS ALWAYS SOLD FOR \$1.00.

NOW only **50¢** Postpaid
or at your Dealer

SCIENTIFIC AIRPLANE CO.

"HEADQUARTERS"

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In Finland: O-Y Wiklund, Turku, Abo
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Real Thrills of Gas Model Flight THEY LOOK, FLY AND SOUND LIKE GAS MODELS

THE FLEA

FLIES 1 MILE

Wing 38" Length 28" Weight 4 oz.
(5280 ft.)

This new type of model airplane developed by Scientific will give you all the thrills and excitement of building a real gas job. Thousands of builders have constructed these remarkable models and gotten truly exceptional flights. Build one yourself now and experience the fun you, too, can have with a fine flyer!

The Flea kit is absolutely complete, containing all balsa parts cut to size, dummy gas engine and spark plug, ball bearing washer, motor hum ratchet device, insignia, rubber, metal parts, liquids, full size plans with explicit instructions. Complete, including a pair of M & M wheels.

\$1.95

Postpaid



"FIREFLY"

Wing 38". Length 28"
Wt. 4 ozs.

FLIES 1 MILE (5280 Feet)

The "Firefly" is the next best thing to a genuine gas model. Its advance clean design and beauty will startle you. Think of it as a true gas type model that will soar majestically aloft, steady and graceful as an airliner under expert command! Dummy motor, propeller, full size plans, and a pair of M & M pneumatic rubber wheels.

\$1.95

Postpaid

A LADY BUILDS A FIREFLY GAS TYPE MODEL, AND IT FLIES FOR MORE THAN SIX MINUTES



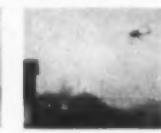
Mrs. Kline and Firefly



Ready for take-off



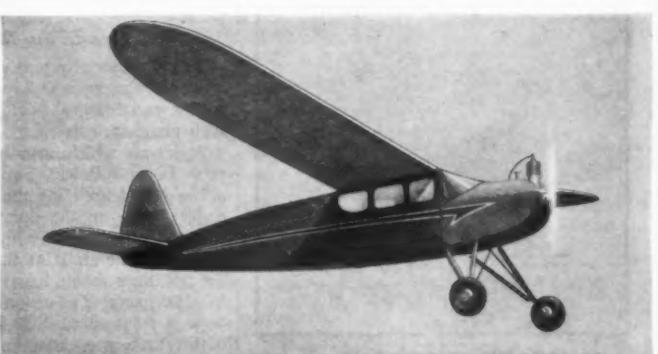
Flying high



Coming in for landing

Dear Sirs:
Enclosed find pictures of Mrs. Kline and her Firefly model. This is her first model and has proven very satisfactory. To date the model has had about 70 good flights, many times flying over six (6) minutes. We flew it in windy weather and it was really amazing to watch the Firefly climb high out of the flying field.

Yours truly, Dan Kline.



MISS AMERICA

Gas Type—Rubber Powered Model Airplane

40" Wingspan

Weight 4½ ozs.

Length 27½"

Flies 1 MILE (5280 feet)

This is an exact replica of the full size Miss America gas model. Recently a Miss America gas model flew for 46 minutes on a motor run of only 27 seconds, breaking all world's records for so short a motor run.

The new Miss America Gas Type Model has all the features of the large model. It takes off from the ground within 4 feet and climbs straight up, climbing at an unbelievably high rate without the slightest bit of stalling. Can easily be built by a modeler with little or no past experience. On test flights it passed every qualification of the rigid Scientific standards. Contains Kit 100% complete (similar to parts in Firefly and Flea).

\$1.95

Post-Paid



MODEL CRAFT

RUBBER POWERED MODELS
THE WORLD OVER

**SEVERSKY P 35**

This ship is said to do over 300 m.p.h. Kit has turned cowl, hard wood prop, cement dope, trim color, and easy to follow plans. You will like this ship. Wing span 24 inches.

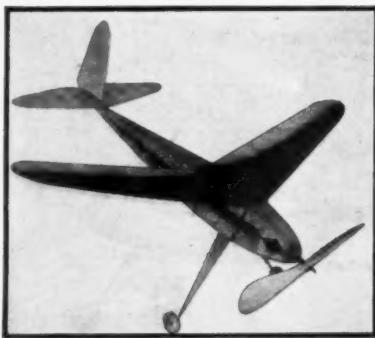
\$1.00**NORTHROP A 17**

This high speed attack plane is known to all interested in planes. 24" accurate model. Detailed plans make building easy. Kit has turned cowl, cement dope, trim color, hard wood prop, and balsa.

Add 10c Postage.

\$1.00**30 in.
PACIFIC ACE**

A practical and durable commercial model. Easily constructed from well drawn and detailed plans. Kit contains an ample supply of first grade wood and high quality cement. Comparable with and out-flies most dollar kits. Add 10c for Postage.

25c**RECORD WRECKER**

Newest Modelcraft Sensation! With a 26" span the Record Wrecker includes freewheeling unit, rubber lube, contest rubber, best quality balsa, cement, dope, and large full size plans.

50c

MODEL CRAFT
7306 S. VERMONT AVE.
LOS ANGELES • CALIF.

that the line of resistance assumes in each case. The general settings of the surfaces that insure a maximum climbing angle and a flat glide for each particular type have been determined from the results of hundreds of tests. They will work satisfactorily in nearly all cases regardless of the details of design. The following are recommended.

Mid-Wing Models

The line of resistance in this case is about coincident with the thrust line. Therefore, there will be very little, if any, stalling or pitching moment due to the couple between the force acting along the line of resistance and the thrust force of the propeller. (See Fig. 1.) The stabilizer therefore does not have to act to balance such a force couple that might disturb the plane when in flight. Thus it may be set at zero degree angle of incidence; that is, parallel to the thrust line.

In order to produce proper longitudinal righting moments the wing should be set at a greater angle of attack than the stabilizer. The minimum angle should be plus two degrees. An angle of two and a half degrees may be used if the tail moment arm is greater than half the wing span. Otherwise it is not advisable.

Under these conditions the center of gravity should be located at a point approximately 35% of the wing chord length back from the leading edge of the wing. If the area of the stabilizer is 40% of the wing area or more, the center of gravity should be about 45% of the chord back of the leading edge.

These relationships are accurate when a stabilizer of flat or streamline cross section is used. If the stabilizer is of the positive cambered type it should have the same setting or zero degrees. However, in such cases the wing should be set at an angle of incidence of three degrees positive to the line of thrust.

The chief advantage of this arrangement is the greater floating qualities produced, and the flat glide that results from the fact that the wing may be moved forward until the center of gravity is at a point 50% of the chord back of the leading edge of the wing.

Low-Wing Models

This type usually puts fear into the most expert designers, who have grown to expect erratic and illogical performance whenever such planes are flown.

A set-up which usually gives good results is as follows: Set the stabilizer at minus one degree and the wing at plus one degree angle to the line of thrust. If the thrust line is unusually high in the fuselage, and the plane stalls at the end of a flight, the stabilizer should be set at minus one and a half degrees. The center of gravity should be at a point about 40% of the chord back of the leading edge of the wing. (See Fig. 2.) Minor adjustments of balance should be made by moving the wing forward or back slightly, as required.

If a cambered stabilizer is used on this type of plane, set it at minus two degrees to the thrust line. If stalling results from this condition at the end of a flight, set it at minus two and a half degrees.

High-Wing Models

A plane of this type is shown in Fig. 3. In this case, the line of resistance is high

and a nosing up couple is created. Thus the stabilizer should be set at a positive angle to balance its effect. An angle of plus half a degree is usually about right. With this stabilizer setting, the wing should be set with an angle of incidence of plus two and a half degrees. If this arrangement produces a stalling tendency during the glide, set the stabilizer at zero and the wing at two degrees.

The center of gravity should be at a point 50% of the chord back from the leading edge of the wing, if the stabilizer setting is plus half a degree, or about 35% back of the leading edge if the stabilizer is set at zero.

Parasol Models

This is the type in which the wing is placed well above the fuselage, as shown in Fig. 4. The line of resistance is unusually high above the line of thrust, which creates a tendency for the tail to be depressed. Therefore the stabilizer should have a positive angle of above one degree. The wing should have an angle of incidence of at least three degrees. The minimum difference in angle in any case should be two degrees. The center of gravity should be located 50% of the chord back of the leading edge, at least. In the case of some planes, such a set-up will require that the center of gravity be located 60% back. If the plane stalls on the glide with this setting, reduce the stabilizer angle to plus half a degree and move the wing back so the center of gravity is 45% back of the leading edge of the wing.

In the next article hints will be given which will show how to change the character of the model's flight by slight changes in the general settings given here.

Frontiers of Aviation

(Continued from page 17)

results. All this in order to catch up with the American manufacturers along that line.

This "tail-first" idea of Lockheed's which we mentioned last month is still balanced on the well known fence, and it would not take a foreign country long to catch up with us in that respect. Of course the tail-first idea is as old as the Wright Brother's first achievements, but the only real past duplication to its modern form is the work done by a man named Fennic about ten years ago. In one of his first ships the nose wheel collapsed when landing, but this only gave him more determination, and, for its time, the last plane he built was really exceptional in appearance. It was a low-wing, twin-engined job with the horizontal tail in front together with nose wheel. Unfortunately Mr. Fennic was killed at the National Air Races while demonstrating one of his products. There are many problems to be solved though in this tail-first business, and the sledding will not be easy. However something must be done. Take a look at the three view drawing of the Douglas DC-5 accompanying this article and note its long tail projecting from the main landing gear wheels. Nature tells us that there must be some way to improve on this, and at present putting the tail in front seems to be the only solution.



HELLO FELLOWS:

AFTER MONTHS OF EXTENSIVE ENGINEERING WE ARE READY TO ANNOUNCE THE MODEL CRAFT PROPELLER BUILT ENTIRELY ON OUR REVOLUTIONARY NEW PROPELLER MACHINE, THE ONLY ONE OF ITS KIND. A MECHANICALLY MADE PROPELLER; EACH ONE PERFECTLY BALANCED AND DESIGNED TO ALLOW YOUR ENGINE TO DELIVER ITS FULLEST MARGIN OF POWER. AND LAST BUT NOT LEAST—ALL SIZES ARE TWO-BITS EACH. *Barney Snyder*



MISS TINY

Model experts stand in awe at the performance of this new Tiny sensation.

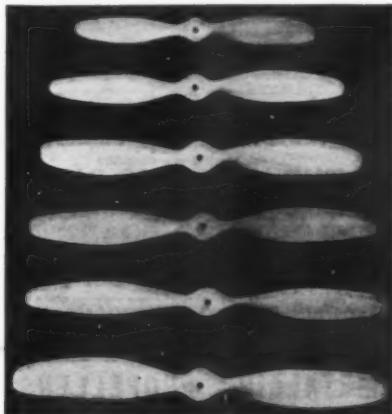
A pocket edition of the Pacific Ace, 46" constant cord wing. *Miss Tiny* has a record of 24½ minutes on a 45 second engine run. For Ohlsson 23, Phantom and other ½" engines. Wing span, 46". Deluxe Kit contains spun cowl, silk, 2½" Volt Air Wheels, cement, dope, die-cut ribs, plenty of good balsa, and full size plans. Price.....\$3.95 Standard Kit same, but with bamboo paper covering.....\$2.95 Dry Kit complete except for wheels, covering, cement and dope.....\$1.95 Plans only.....25c

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1/7 H.P. 6500 R.P.M. Weight bare 3 1/2 oz. Runs upright or inverted; fully assembled, complete with coil and condenser.



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New throughout, with latest improvements in design and construction. Flying weight 3 lbs., 4 oz. Wing span 66 in., tapered from 12 to 5½ in. De Luxe Kit contains tapered spars, beveled and tapered trailing edge, die-cut ribs, turned aluminum cowl, 1 qt. gas dope, 1 pt. cement, 3½ yds. super silk, formed landing gear, 4½ in. inflatable air wheels, dural wire, alum. tube, washers, bolts, haskalite, dural sheet, hook up wire, switch, selected hard balsa, full sized, black and white plans with test flight instructions, complete.....\$8.50 Standard Kit with bamboo paper, ½ pt. of dope, 1 pt. of cement and 3½ in. air wheels.....\$6.25 Dry Kit same as above without cement, dope, silk or wheels.....\$4.75 Plans only.....50c

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Made of aluminum with
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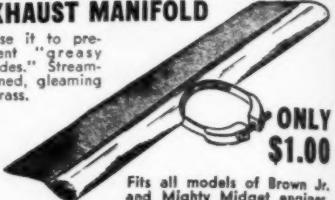
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The fact still remains that our designers have given it serious thought, and we can rest assured that it will be several years yet before a foreign country can match us design for design. But if there is a country that will surpass our accomplishments during 1939-1940 we hope it is England for she is one of our better friends and does produce excellent aircraft.

The Supermarine Spitfire now built by Vickers-Armstrong Ltd. has a span of 36 ft. 10 in.; length of 30 ft. and a height of 11 ft. 5 in. The fuselage is flush riveted and carries a 1,030 hp. V-12 cylinder Rolls-Royce water-cooled Merlin in the nose. The plane is of course a single seater with a well designed enclosure that does not stick up like a sore thumb, as they do on all of our observation and pursuit planes. Though visibility may not be good when taxiing, the enclosure has all the other desired qualities. It is said that the Merlin engine develops 1,030 hp. at 16,200 ft. with 87 octane fuel. Eight machine guns are located in the wing which warrants the name of "Spitfire." The only design detail that seems out of place is the use of a fixed wooden two-bladed propeller; but in comparing the Spitfire with our latest, the Curtiss P-40, we suggest that the P-40 be thrown on the junk heap!

In delving into the planes at the Paris Aero Show we suppose we should mention the French planes for, after all, it was France that gave the show. Apparently they are running out of barn doors in France, for the Farman product of 1939 actually had clean rounded tips to its wings. However Farman is still holding out for square fuselages. But before we go into further detail let us stop at the wing tips awhile. (We need a rest anyway before delving into anything like the four-engined Farman.) The mere fact that Farman has discarded the "chopped

off" wing tip after all these years is reason to believe that the stub wing is on its way out. However in the United States in engineering journals there has been mention of the use of stub wing tips and some manufacturers are even considering their use because of better stall characteristics and so forth. Among outstanding airplanes of recent years with flat tips have been Bellanas, the Handley Page Hampden and the Messerschmidt speed record holder, to name a few. Though the design of a wing tip is seemingly a simple matter it will develop into one of the more important discussions during 1939. Though a plane with "sawed-off" wing tips holds the world landplane speed record, the German Messerschmidt, we still have more faith in the way Lockheed and Sikorsky go about it.

The Farman is a four-engined transport not unlike its predecessors except that it has been cleaned up. Two 1,000 hp. "Hissos" in tandem are slung under each wing with the landing gear going up into the nacelles. A big airplane, it has a span of 100 ft. and lifts enough gas for about a 5,000 mile range.

Marcel Bloch had one of the more interesting displays though it was just a mock-up of the real plane. It was the Bloch 162 B5 six-place four-engined bomber. The plane is about the cleanest thing France has developed to date and is of the general appearance of our Boeing B-17. However there was no sign of superchargers as used on the forthcoming B-17's and thus it is not able to get up to the heights that our new bombers are expected to reach though they have engines developing a little more than 1,000 hp. full out. Having a span of 93 ft. the airplane is said to do 280 m.p.h. with 4,000 pounds of bombs. As on many of the new French planes very large spinners are used covering most of the

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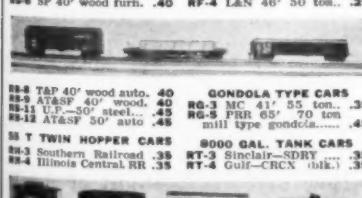
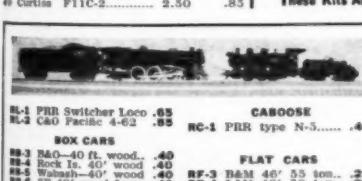
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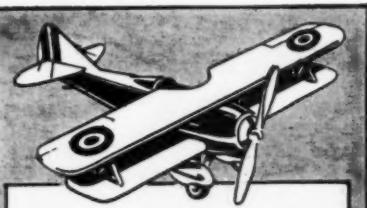


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DLSF-71 Folkert Special 2.00				Volt Air Wheel, 4 1/2" dia. per pair 2.50
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1/8x1/16 10 for 50

3/16x3/16 8, 50

1/4x1/8 6 for 50

1/4x1/8 3 for 50

1/8" BALSA

1/16x1/16 100, 50

1/16x3/16 35 for 50

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WHEELS per pr.

Bush Bias Cello

1/16x4/16 15 for 50

3/32x3/32 30, 50

1/8x1/8 10 for 50

1/8x1/16 12 for 50

1/8x1/16 10 for 50

3/16x3/16 8, 50

1/4x1/8 6 for 50

1/4x1/8 3 for 50

1/8" BALSA Sheets

Alum. Tubing

1/16x4/16 6 for 10c

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1/16x2/32 8 for 10c

3/16x1/16 8 for 10c

1/16x1/8 6 for 10c

1/16x1/16 8 for 10c

WIN**\$25.00****\$15.00 • \$10.00**FOR A RECORD FLIGHT WITH
THE SENSATIONAL LOW WING**STARLINER**

Powered with the Inverted Hi-Speed Engine

On Saturday, April 8, 1939—to be known as Starliner Saturday—you can win a \$25.00, \$15.00 or \$10.00 cash prize with a Starliner low wing plane—no matter where you live within the United States.

This sensational new 54-inch low wing kit is designed especially for contest use and is built around the famous HI-SPEED $\frac{5}{8}$ engine, now inverted for peak power output.

The Starliner with 445 sq. in. of wing area meets all N.A.A. racing requirements. It has SPEED—FAST CLIMB—and a S-L-O-W flat glide. Repeated test flights over the past three months show an average of 7 minutes total flying time for each 30 seconds engine running time. Get this sensational kit at your dealer's today and be the first with the latest. You do not have to enter the contest to buy the kit. Satisfaction guaranteed.

ACT QUICKLY TO ENTER

You have no time to lose. Enter this contest TODAY. Read the contest rules, then see your local dealer immediately.

\$4.45**STARLINER KIT**

Complete Kit (less motor) includes 2½" air wheel, silk, dope, cement, full size plans and instructions, and plenty of good balsa wood. Everything is furnished—nothing else to buy.

**CONTEST RULES**

- 1— Go to your favorite dealer now and tell him to enter you in the Starliner Contest. He will RESERVE a Starliner kit for you.
- 2— On March 18, 1939, your dealer will deliver your Starliner kit to you. (This date has been fixed so that, wherever you live, you will get your kit on the SAME DAY as everyone else.) If you do not now own a HI-SPEED engine your dealer has one in stock for you.
- 3— Build up your completed Starliner monoplane, check it, test it, make sure everything is in perfect condition. Then,
- 4— On April 8, 1939—Starliner Saturday—your dealer will hold a Starliner contest for a time flight on a 30-second engine run. Certified results will be rushed to headquarters. For the longest timed flight—wherever it is made—\$25.00 will be awarded. For second best—\$15.00. For third best—\$10.00.

NOTE—If there is no dealer in your territory write to the factory TODAY for your Starliner kit. Enclose \$4.45 money order for kit. If you have a HI-SPEED engine send 50c additional for the inverted changeover, or \$13.25 for the new inverted HI-SPEED engine complete. This material will be sent prepaid to reach you on March 18, 1939, and we will arrange to have your flight on April 8, 1939, officially checked by Western Union.

HI-SPEED HAS PERFECTED**INVERTED OPERATION**

The INVERTED HI-SPEED engine incorporates two outstanding features which assure you of peak power operation:

1. SUCTION FEED, which gives positive operation even in the steepest climb, and
2. EXCLUSIVE OFFSET SPARK PLUG. It has been definitely proved that this feature reduces the fouling, heretofore so apparent in 2-cycle engines, especially in inverted operation.

\$13.25INVERTED
HI-SPEED

WIN AN ADDITIONAL \$100.00

Here's more money for you. Enter your Starliner plane, equipped with the HI-SPEED engine, in the big N.A.A. meet this summer. To the winner who flies this record-breaking combination—a certified check for \$100.00.

HI-SPEED DIVISION
M4, 800 East Gage Ave.
Los Angeles, Calif.

NEW! FLEET TRAINING PLANE

\$4.95

Complete
PostpaidScale 1 1/4 Inches. Span 35 Inches.
Length 26 Inches. Weight 8 oz.**CONTENTS:**

ALL LIQUIDS Including touch-up enamels in 3 colors. • **PLANEFILEM** for covering — M & M AIR WHEELS. • **BALL BEARING SHAFT**—12 in. finished prop. 3-16. in. flat rubber. • **ALUMINUM MOTOR TUBE**—CUT-OUT CYLINDERS. • Shaped and Drilled Motor Block. Finished Ribs—Full Size Plans.

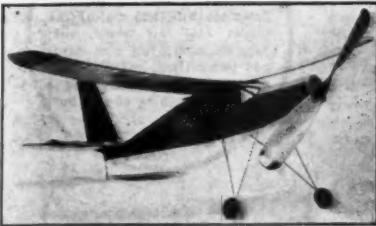
This plane is large enough and stressed to carry the smaller gasoline engines.

Not recommended for beginners.

SUPERIOR MODEL CO.

P. O. Box 1994

Tulsa, Oklahoma

READY-CUT RIBS**30" Endurance Senior 50c**

Plus 10c Postage

A REAL CONTEST WINNER! Contains Cut-Out Ribs for wing and tail, Special Finished Prop., 16' feet of rubber. Best flight 1 hr. 15 min. before going out of sight.

These Models Guaranteed to Fly

DeLuxe Kit—Same as above plus extra rubber motor, clear dope, free wheeling, rubber lubricant and extra material. Postpaid \$1.00.

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It Costs No More—Use the Best!

Size	Sc	225	30c
3 1/2-25'	Sc	225	35c
3 64-18'	Sc	225	40c
1 1/8-14'	Sc	225	40c
5 1/2-12'	Sc	225	50c
5 32-10'	Sc	225	60c
7 64-8 1/2'	Sc	225	70c
1 6-7 1/2'	Sc	225	75c
5 32-12 1/2'	Sc	225	80c
2 1/2-10'	10c	225	90c
2 1/2-10'	10c	225	\$1.00
2 1/2-10'	10c	225	10
2 1/2-10'	10c	225	\$1.25

All 1/30" Thick—Minimum Order 50c

DEALERS:—There's a great market for genuine SPECIAL BROWN CONTEST RUBBER. You can buy it in skeins or on spools. Write on letterhead.

MANUFACTURERS:—We are national distributors of this product. It costs no more than inferior grades. Write us for quotations for the best. Our Low Price will surprise you. Use it in your kits.

MORE POWER TO YOU!!

Polk's Model Craft Hobbies, Inc.
429 Seventh Ave., Dept. M-4, New York

Imperial Airways. A couple of the planes on order will be used by Imperial for trans-Atlantic service.

If you wish to square-off the accompanying plans, making measuring easier, join the corresponding dots on the border with straight pencil lines. The plans may be photostated to any desired size at little extra cost.

The entire model is to be made from balsa wood which may be purchased from any supply company advertising in this magazine. Wheels and other incidentals may also be purchased if desired.

Make the long, slim fuselage of the plane first. Draw the outline of the top view on stock with the grain of the wood running lengthwise and cut with saw. Go over the sides with coarse sandpaper and then draw the side view in correct position. Again cut and sandpaper. Then using a razor blade shape out the contour of the fuselage as shown by the cross-sections, starting in the middle and working out towards the ends. Next sand down the surfaces with coarse and fine sandpaper.

The wing is to be made in two parts, the left and right wing panels with the engine nacelles made separately. Draw the plan view of the pieces on stock and

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Amazingly Easy to Build

Note these exclusive features

- * A new type, scientifically designed, super streamlined monocoque elliptical balsa fuselage
- * Positive mechanical shock-absorbing landing gear
- * Safety stressed nose
- * High thrust line
- * Fully proof motor, front and rear
- * Heavy 1 1/4" prop.
- * Adjustable foot-proof free wheeling
- * Adjustable wing and rudder
- * Safety wing mount
- * Cap stripped ribs
- * Sheet balsa stressed elliptical wing
- * Colored tissue
- * Berry-fold liquids
- * Simplified construction throughout
- * Meets N.A.T.A. Rule
- * **Polk's PIONEER**

Wingspan 38" Length 30".
The Model of Tomorrow—Build It Today. Only.

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429 Seventh Ave., Dept. M-4, New York

\$1.50
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cut to shape. With a sharp, flat chisel taper the wing panels down as shown in front view. Be careful and accurate. When that is completed finish the shaping of the wing as shown by the airfoil sections and apply the usual sandpapering.

The tail surfaces are very easily made from sheet balsa, using a razor blade for cutting. The four engine nacelles are made in the same manner as the fuselage. They are to be made to fit in grooves cut into the leading edge of the wing.

Then make the spinners to fit these nacelles and the two blades for each propeller.

The next step is the assembly of the model. Lay the fuselage in flying position on a flat surface and join the wing panels. All connections are to be made with quick drying model cement. Put blocks under the wing tips to hold the correct dihedral. When joints have dried put the tail units on the fuselage one by one. While they are drying the nacelles may be put on and the prop blades cemented to the spinners. Straight pins inserted through the spinners may be used as propeller shafts.

When all these things have been accomplished and all connections have dried thoroughly lay the model on its back and build up the landing gear. The forks and axles may be made from a thick gaged wire and joined to the shock struts cut from balsa wood. Shape out two gear fairings and cement in place with a goodly supply of model cement. Connect the tail wheel with wire fork and shaft and then go over all joints once more with model cement.

Sandpaper the model thoroughly. Brush off all dust to begin the paint job. The color scheme is optional. Many coats will have to be applied to fill up the paws in the wood. After several coats have been applied the model will then be completed.

A Motor With Wings

(Continued from page 11)

Wright's latest creation: the CW-21, depicted in a slashing battle pose this month by our cover artist.

By its very nature this ship necessarily had to be fast climbing, but in addition it had to pack a murderous wallop, the ability to dispose of attacking enemy craft with promptness and thoroughness. Tactically, the safest flight altitude for a squadron of

Berkeley's New

Rubber Powered—30" Wingspan "BUCCANEER"

WITH BALL BEARING PROP SHAFT

BALSA COVERED WING—"SEMI-PLANKED" FUSELAGE
WIRE "GAS MODEL TYPE" LANDING GEAR

No airplane in the history of model building has established such a long line of records equal to that of the "BUCCANEER". The Model, holder of both the Senior and Open World's Record under both limited fuel allowance and Limited engine run rules. In response to your demands we give you the rubber-powered "BUCCANEER." Designed for a 4-cylinder Menasco engine to give scale model appearance.

Kit includes everything to build the model as pictured. All balsa parts are printed out; semi-finished nose block; liberal quantities of cement and dope; and full-size, easy-to-follow plans.

**\$1.00
P.P.**



\$5.00 Prepaid
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Complete Kit
Less Wheels & Power Plant

The "BUCCANEER-STANDARD"

5 1/2-FOOT WINGSPAN—FOR 1/6 to 1/5 HP.

Limited Engine Run Champion and Certified Senior N.A.A. Record Holder. Twice as strong as other models of the same size and weight. Beautiful lines, perfect flyability and many performance make it America's Number One Gas Model.



EVERY BERKELEY GAS MODEL KIT INCLUDES:

1. Full Size Plans with pictures and three-dimension sketches of the construction. 2. All wooden parts printed out. 3. All Balsa Strips and Blocks cut to size and properly graded for strength. 4. Special Steel Wire for Landing Gear. 5. Hardware, Metal Fittings and ignition accessories. 6. Cement and Colored Dope (Choice of Colors). 7. Wings are removable on all models. 8. Everything is included to complete the model exactly as pictured except the power plant and wheels.

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Fall 1 1/2 h.p. with power to spare. The only unconditionally guaranteed motor in its price class.

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\$21.50 P.P.

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Brown Model "E"

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THE OHLSSON "23"

1/7 Horsepower
5/8" Bore x 3/4" Stroke

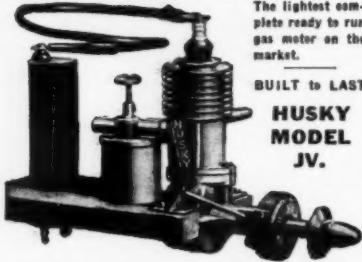
The engine that powered the "BUCCANEER-48" to the Small Bore Championship. Easy starting and gives nearly two lbs. static thrust.

**\$16.50
P.P.**

Ohlsson Gold Seal—1/8 H.P. \$16.50 P.P.

Ohlsson Gold Seal—1/8

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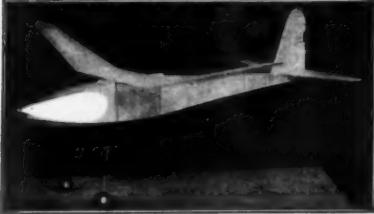
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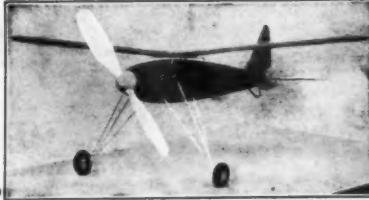
Douglas-Designed AERO-GLIDE



AERO GLIDE — Wingspan 41", length 30", wt. 3 oz. Kit containing all parts except main folding propeller. HANCOCK BALI BEARING propeller shaft. Includes model wheels, special brown contest rubber motor—glue, dope, tissue, wing ribs and other parts printed on "Aero" sheet bassine—all struts and tail surfaces full size sets. 1/16" sheet drawing. "Aero-Glide" Kit complete \$2.25 Postpaid. Douglas-Designed Aerobatic Kit complete \$1.25.

Send Money Orders or CASH only. When sending cash factor colors or if located in Washington add State Tax.

Douglas-Designed "Universal Speedster"



Span 30". Length 25". Wt. 2 oz. This new Douglas-Designed speed model has absolutely EVERYTHING you need. ALTITUDE — SPEED — ENDURANCE, perfect GLIDE and M & M Model Wheels for smooth landings. Complete Kit with M & M Model Wheels only \$1.50 P.P.

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enemy bombers and its protective consort of wasp-like pursuit ships is that debatable strata just beyond the effective, accurate range of the defensive anti-aircraft guns. This latter depends to a large extent on the modernity of the artillery equipment and to an even larger extent on the expertise of the crew. However, according to a high-ranking military officer, one who has actually been in the field and served with A-A gun companies, in that area above ten thousand feet the chances of a direct hit are virtually nil. Therefore, the enemy bomber pilots consider below ten thousand feet the danger zones. Opposing this is the fact that bombing becomes more accurate the further this danger zone is penetrated; i.e., the lower the pilot flies. Thus, all things considered, the layer between eight and ten thousand feet is the most consistently used by raiding bombers.

However, all of this military logic has been extolled without a consideration of an unorthodox yet dangerous group of military fighters: the interceptor pilots. Here is the only, yet irritating, thorn in the side of hostile bomber crews. At the latter's eight thousand foot altitude, they are exactly TWO MINUTES away from death; for in that time a full squadron of fast-climbing interceptors could be at their height and attacking them with venomously chattering machine-guns. The enemy's horizontal path of escape, a wild dash for freedom, would be useless for these ships can travel as fast HORIZONTALLY while they are climbing at ONE MILE A MINUTE as the enemy bomber can! Thus, while long-time service equipment in Eng-

land, this new weapon of aerial warfare threatens if not the destruction at least the serious detriment of the accuracy of heavy enemy bombing through forcing the bombers higher and thus hampering their effectiveness.

In the interceptor-fighter everything is not subordinated to a high rate of climb for the rapid ascension to the enemy's altitude is only the first duty of the ship. The vicious attack and slaughter of him is the next consideration and without this faculty, a five-thousand feet per minute rate of climb would be useless.

The Curtiss-Wright CW-21's ability to climb better than five thousand feet per minute, its extreme maneuverability and its armament of one thirty and one fifty caliber machine-gun have more than fulfilled these obligations. This tiny monoplane is not a startlingly new creation from its engineering and design standpoint. In reality it was born three years ago with the debut of the Curtiss-Wright CW-19 "Coupe," two-seat miniature airliner of all-metal construction. In the past three years it has undergone astounding detailed design changes, never varying from its fundamental principles but progressing inexorably forward in speed, power and maneuverability. In place of the small 420 horsepower Wright "Whirlwind" now roars the near one thousand stamping, impatient horsepower of the huge Wright "Cyclone" model G-100. In place of the tiny doughnut wheels incased in projecting streamlined pants is an ingeneous single-strut retracting landing gear. And in place of the 196 miles per hour top speed of the original Coupe is the 304 miles per hour clip now attained by the interceptor. How have these radical changes been accomplished?

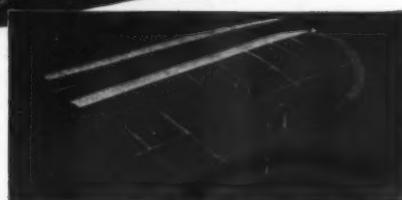
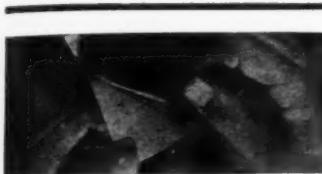
"The CW-21 is a flying machine stripped for action with no surplus; nothing but its engine, its fuel, machine-guns, ammunition, oxygen tanks and a skillful pilot," states C. W. France, Vice-President of the Curtiss-Wright Corporation and manager of the St. Louis Airplane Division in whose plant it was built. "I believe the ship has the fastest rate of climb of any plane in the world. It is a short-time fighter, not built for endurance, but built to deal hard, swift, smashing blows at short range and then, its objective achieved, return home."

The CW-21 is of all-metal construction, the fuselage being built up of longitudinal stringers, transverse bulkheads and rings covered with 24 ST Alclad sheet in a firm semi-monocoque. The huge Wright "Cyclone" GR-1820-G103, bolted to the nose, develops 860 horsepower at 2200 r.p.m. at 10,000 feet and offers 1,000 horsepower available for full throttle take-off.

This drives the latest Curtiss electric three-bladed controllable-pitch propeller. The engine is cowed in a special patented design in which the sides lift up, hinging at the center on top, similar to that of an automobile hood. The pilot is located amidship near the mid-point of the fuselage. He is completely enclosed by a brace-free forward windshield and a large sliding hatch which travels rearward on guides. The tail surfaces are of all-metal structure, Alclad covered and are full cantilever. They are built up on a multi-cellular base, the horizontal and vertical stabilizers (fins)

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Non-porous, smooth as glass, PLANEFILM can be applied in a fraction of the time required by old methods. Actually stretches itself drumlike over irregular curves . . . easy to get even tension on surface areas, even distribution of weight and perfect balance so necessary to good performance. PLANEFILM comes attached to backing sheet—it is easy to handle and cut to shape. Stripped from backing, it is soft and pliable, and forms to the many curves necessary in model building.

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Experienced model builders know that Megow models can be built in a fraction of the time required for other kits. For instance, note the time-saving exclusive Megow Ready-Carved Leading Edge used on this new Piper Cub! Among other time-savers that help you produce expert jobs, remember that Megow plans are large, clear and easy to follow—that they have been thoroughly engineered and tested—and that Megow kits contain only complete materials of the very highest quality.

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being fixed. Both rudder and elevators are equipped with controllable trimming tabs.

The wing is of multi-cellular construction being built up on a five-spine principle. It is of a special CW-19 airfoil section and tapers in planform and thickness. The trailing edge is straight and at right angles to the longitudinal axis of the fuselage. The leading edge sweeps rearward sharply. The flaps are all-metal split-edge type and move through an arc of thirty degrees. Through their use the landing speed has been decreased to 64 miles per hour. They are used, also, throughout the initial climb at a depressed angle of between five and ten degrees to give the wing a higher camber and subsequent greater lift. The ailerons are all-metal and positively controlled by bars and bell-cranks.

The center-section is built integral with the fuselage, the outer wing sections joining at a point just outboard of the landing gear housing. A full travel oleo single-strut design is used with retraction by hydraulics. The cover plates swing inward and seal the opening with the exception of the rearmost portion which is made up of the exposed wheel. The tail wheel is full swiveling.

Armanent abroad the CW-21 consists of one thirty and one fifty caliber Browning electrically actuated machine-guns mounted within the cockpit and capable of firing twelve hundred rounds per minute. Cocking, loading and adjustment handles are located on either side of the instrument panel within easy reach of the pilot.

The barrels extend forward within the fuselage, pass between the cylinders of the

motor and terminate in flush housings along the front upper face of the cowl. They are liquid-cooled and fifty thousand rounds of ammunition is carried. The guns are aimed through a unique sighting arrangement in which the forward sight post is located at the conjunction of the engine cowl and the fuselage and the rear ring sight is mounted within the cockpit suspended from the windshield.

Defensively this little interceptor is surprisingly well protected, for heavy armor sheathing has been placed along the sides of the cockpit. The pilot is protected from the front by the giant engine, from the sides by the heavy plating and from the rear by a heavy sheet of armor located within the fuselage just to his back.

The fuel is carried within the wings in four separate, individually controlled tanks each having a capacity of twenty-four gallons or 96 gallons in all. This is sufficient to give it a cruising range of 630 miles, which compares favorably with the average heavy-duty fighting plane.

Stressed throughout the design is the ease and sphere of maneuverability. According to the test pilot, the ship handles almost instantaneously and the controls, while sensitive, are not the "killer" type in which the pulse of a man's hand throws the ship out of steady level flight.

The CW-21 has a wing span of 35 feet and is 26 1/2 feet long. When loaded and fully equipped it has a gross weight of 4250 pounds, which indicates to a degree the efficiency of this ship which, although small, weighs as much as standard service models. Official performance figures released by Mr. France quote the ship as having a top speed of 304 miles per hour and a cruising speed of 275 miles per hour. It has an initial rate of climb of five thousand feet per minute, which, according to the Air Corps' scientists investigating pilot fatigue, is just about the limit of human endurance to change in atmospheric pressure.

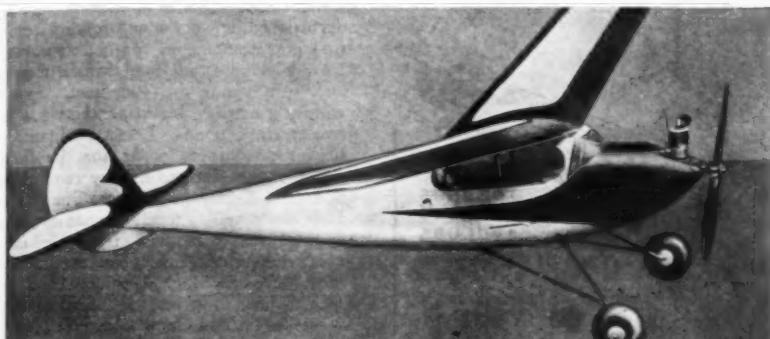
It will climb to twenty thousand feet in five and eight-tenths minutes, far too fast for its victim to escape its murderous assault.

Actual purchase negotiations have not as yet had time to develop, but the United States Government has declared the CW-21 available for export, which usually means that our army and navy are not especially interested in the ship in its present form. However, suggested changes have been tendered by the Army Air Corps and when these modifications have been completed the ship will be consigned to Wright Field for the rigorous experimental test routine. The CW-21 is America's first interceptor and several problems relative to such an entirely different type of ship and its method of operation as a military weapon must be ironed out before large numbers are ordered by our army or navy.

Speculators and actual representatives of this world's two major battlegrounds have examined the CW-21 and reported their interest. China especially could use several hundred of them to protect her ravaged cities from more of the sudden annihilating air raids by Japanese bombers. And when it is borne in mind that Curtiss-Wright maintains a huge factory and fast-moving production line at Shuiwan near Canton,

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Wing Span 72" Length 48" Weight 3 Lbs. with engine



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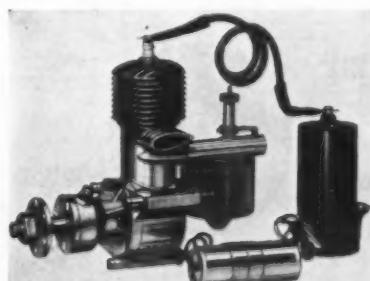
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Total weight, without motor, 8 to 10 oz. Plans are in blue reverse. Each part drawn full size. 3-view, full size layouts for these 50" planes; also, full size perspective sketches of each. Every part shows partial and full assembly.



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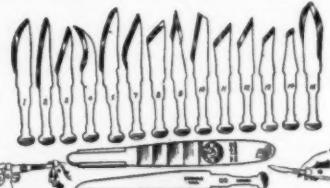
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perhaps the multi-pointed stars of the Chinese National Air Force may soon be emblazoned across the war-torn skies of the Orient on the wings of the Curtiss-Wright CW-21, the world's supreme interceptor-fighter!

Build a Model Curtiss-Wright Interceptor

Select a block of good, sound balsa 6 1/2 x 1 1/4 x 1 1/4 inches and with the use of carbon paper trace the side view of the plans onto it. Or you can make a template of the entire fuselage. Take a small hand- or band-saw and follow this outline completely around. Next, trace the top view on the top of the piece and cut out with the band-saw. Third, outline the circular front view and carve down with a small lathe taking care not to turn down more than the engine cowl.

Take a carefully prepared razor or hand carving tool and slice down the four corners of the block until the fuselage is in a very rough circular section. From the four sectional views shown on the drawing, cut out templates of heavy cardboard and fit them into their indicated places. Whittle the fuselage down until it approaches the exact outline more closely but DO NOT attempt to carve it down to the exact section; that will come later. Now, select a heavy grade of sandpaper and sand the fuselage down. Use a medium grade, then a very fine grade for the finishing touch. At this stage it is wise to apply the preliminary coat of paint, the brilliant shade pictured on the cover. Allow this to dry and sand it down until the paint remains only in the veins of the wood. Then apply the usual three heavy coats for final painting. You'll be astonished at the smooth coat that results.

The wings are cut from a balsa plank, carefully selected for clear grain, about 4 1/4 x 1 3/4 x 1/4 inches. Trace the outline of the top view onto the balsa and slice it out with the band-saw. Next, mark the front view showing the sharp taper

onto the plank, using either the band-saw or a light hand-plane. If carefully done, the leading and trailing edges may be sliced off with a knife but great care should be taken not to overdo this portion of the work. Sandpaper should be used almost exclusively on the wing, for its smoothness is paramount for finished appearances. Now apply the two wing section templates and, using your eye judgment, taper the wing with heavy sandpaper between these two working points. Use a medium and a light grade of sandpaper for the finished work. Apply the preliminary coat of paint and sand lightly as before. The tail surfaces are made in much the same way and sections may be taken from the end-on views in the drawings. Not until all parts have been thoroughly painted and dried should assembly begin. Take care that points of actual contact are left free of paint or your efforts to glue them will be exasperating in the extreme.

The landing gear should be studied carefully before construction is begun, for its accurate and detailed completion will mean the difference between a good model and a prize winner. In each model one single portion of the ship is astounding, and in the Curtiss-Wright Interceptor it IS the landing gear. The retracting cups are made of very thin tin and if a sheet soft and pliable almost to fragility cannot be found, carve these covers out of balsa. Build up the landing-gear strut carefully, running a heavy black painted string along the front of the strut and over the taxying forks to the wheel axles to simulate the hydraulic brake pressure feed line. The wheels are half-inch doughnuts which can and should be purchased for a few cents at any model shop. Study the photographs and the cover drawing carefully for details of the landing gear covers.

The three-bladed propeller should come in for a great deal of attention as its careful construction is a known necessity on any scale model. Give the blades a sharp angle and pin it into the nose with a pin infinitely smaller than the prop hole so

WHAT HAVE YOU?

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• Questions and doubts are always welcome. You can never tell when one of your queries will get us started in a new thought.

• We like to thank our contributors for their generosity. Without their help we would never have been able to publish the Year Book. We are grateful to those who report that the book is now covering its expenses and past obligations almost cleared. We are looking forward to increased circulation so that we can begin full time experimental direction and research work.

• Address correspondence to Editor: Frank Zale.

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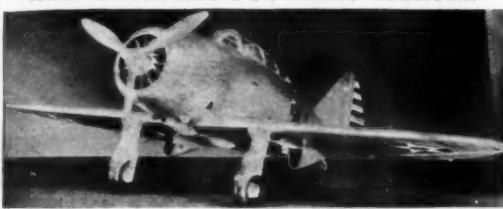
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A brand new model of the 1938 Bendix Trophy Winner P 35. Set has 4" turned balsa motor front, 10" carved prop, balsa wheels, tall wheel, rubber, all parts printed on balsa, 3 oz. silver dope, ½ oz. black, 2 oz. glue, etc. Insignia, and full size \$3.25 scale drawing. Const. set in labeled gift box, postpaid.

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that it will revolve upon application of a little wind. The powerful Wright Cyclone may be imitated in half a hundred ways so use your own pet method on this; be it thread-wrapped match-stick sections or a tedious one hundred and fifty-piece job.

The pilots' hatch is formed by bending a piece of celluloid (cleaned photo negatives are good) and gluing to the fuselage at the bottom. The wind-shield is cut out with a pair of scissors and glued on. Several may have to be made in order to get a correct-fitting unit so have plenty of celluloid handy. Paint the hatch lines in with black India ink BEFORE glueing to the fuselage.

If you're handy with an India ink pen, trace on the various details shown on the plans and it will add points in a scale contest. Letter your own initials on the upper surface of the port wing and the number of models you've built on the starboard wing surface and your model will be complete. Our "Air Ways" column anxiously awaits pictures of your model of the Curtiss-Wright Interceptor! So drop us a line and enclose those pictures to 551 Fifth Avenue, New York City. Do it now!

A Gas Powered SE-5

(Continued from page 13)

fuselage after the model is completed, so it may be moved forward or aft to balance the model. The batteries are held in the box with rubber bands.

Tail Surfaces

First, build the stabilizer and slide it into position on the fuselage. The stabilizer should have one degree positive incidence. The fin and tail-skid frames are all of balsa. Sheet aluminum or aluminum wire can be used for rudder hinges. All surfaces should be covered and doped before securing brace wires.

Center Section

This portion of the plane is made entirely of hard balsa. The lower wing stub spars pass through the fuselage. The rear spar will have to be notched to fit over the longerons. The center-section struts are made of spruce. Be sure all struts are cemented firmly. Brace wires must be anchored securely.

Wings

Use hard balsa for wing spars, leading and trailing edges, and medium balsa for ribs. The upper and lower wing panels are the same except that the wire fittings and strut slots are on the under side of the upper wing and on the upper side of the lower wing. Place the fuselage on a flat board (leveled) with the top longerons level. Place blocks under the lower wing tips to get the required dihedral. Now make up the landing wires to exact length. The flying wires have turnbuckles so when the wing panels are assembled to the center-section all that is necessary to rig them is to tighten the flying wires.

Covering

The model may be covered with China silk or light bamboo paper. Water spray

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SPECIFICATIONS

HP—1/7

Bore 5/8" Stroke 3/4"
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Price complete with coil and condenser

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AUSTIN CRAFT

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and dope and be sure surfaces do not warp when drying. Two coats of clear and two coats of colored dope should give the model a neat appearance; spray the colored dope if possible. The model is colored gray with black struts, exhaust pipe; and blue, white and red insignias.

Adjusting and Flying

The model should be glide-tested before attempting to fly it. The glide should be slow with a fair rate of sinking speed. This is due to the larger amount of drag present than in modern streamlined models. With the motor throttled to half speed, hand-launch the model into the wind. It should make a slow even climb. Remember a few minutes spent adjusting your models will mean more hours flying them.

Happy Landings!

Building the Douglas Torpedo Bomber

(Continued from page 21)

and can be obtained at any model counter.

The plan shows the correct number of cockpit formers. Some may be omitted for simplicity. Make the formers from 1/32" square bamboo.

Assembly and Covering

Sand the fuselage and wing carefully so that there will be no projections to spoil the covering. Cover the model carefully with white tissue, using small strips on the curved parts of the fuselage. The landing gear is attached to the wing before covering, and the tissue is cut to fit. All wire parts are .028 wire.

Spray the model lightly with water, and when it is dry, sand off the fuzz which will appear at the leading and trailing edges of the wing and at sharp corners on the fuselage. Give the model one coat of clear dope which has been mixed with thinner in about a half to half ratio. Dope the cowl and other parts, but do not dope the tail surfaces. Sand any roughness which may appear, and then cement the tail surfaces in place. To insert the stabilizer, slit the tail post with a razor, push the stabilizer into position and cement it, then re-cement the tail post.

Add as much detail as may be desired. The model has a standard navy insignia, including stars on top and bottom of each wing tip.

Propeller

Carve the propeller from hard balsa, using a block 4-3/4" x 7/8" x 1/2", or use any medium pitch prop of that size that you may have. Do not use a high pitch prop, for the torque will make the model difficult to control laterally.

Flying

The model should balance just about right if hardwood wheels are used. Test it by gliding it. If it stalls, check the tail attachment, and if there is any perceptible negative incidence cut the stabilizer loose and readjust it to zero incidence. If the model still stalls, sand the tail surfaces. Add weight to the nose only as a last resort. If the model dives warp



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BUD WARREN Says:



Bud Warren block testing Tom Thumb engines.

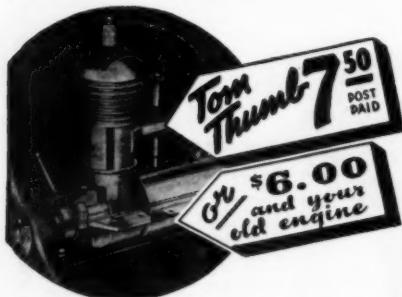
"When it comes to gas models I believe we are all alike! To be your pride and joy a gas model must stand ready for every flight with the 'hottest, easiest starting, powerful gas engine that ever turned a prop.'

"You can bet that each Tom Thumb engine I fly is such a motor. I have made it my daily business to make sure every Tom Thumb 'winds up' on the test stand to meet my own personal standard of performance. It is an everlasting pleasure to take a brand new fully tested Tom Thumb motor, pack it for mailing and know that its performance will win a prop."

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SPECIFICATIONS and HOW to BUY the NEW TOM THUMB

The Tom Thumb is the most powerful easy starting 1/5 H.P. engine made. Clip the coupon below, enclose money order for \$7.50 (also your old motor for special \$6.00 offer), and receive a *brand new* assembled and block tested Tom Thumb. Complete with fuel tank, coil, Champion spark plug, one piece cylinder and head and other modern features. Complete flying weight 10 oz. (less batteries). Bore 7/8"; Stroke 3/4".



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412 Brett St.
Inglewood, Calif.

- Rush me one new Tom Thumb Engine. I enclose \$7.50.
 Rush me one new Tom Thumb Engine. I enclose \$6.00 and my old engine (any make) including all parts regardless of condition.

I intend to run my Tom Thumb—
 Upright Inverted

Street.....
Name.....
City..... State.....

the elevators up slightly or use lighter wheels.

If the model spiral dives under power, warp the trailing edge of the inside wing down slightly.

Use two strands of 1/8" flat rubber, lubricated, with about a half inch of slack. For long flights after the model is adjusted, use a winder.

What Makes It Run

(Continued from page 19)

of operation, but completes them in two strokes of the piston, therefore receiving one power stroke to every revolution of the crankshaft, or twice as many at the same R.P.M. as the four-stroke. The first drawing in Fig. 2 shows the piston at the top of its stroke about to receive the power stroke. As the piston was ascending, it created a partial vacuum in the airtight crankcase. About fifty degrees before "top dead center," the intake port is opened by piston travel, permitting the charge, at a higher external pressure, to enter. We now have a charge in the crankcase, and the piston descending on the power stroke.

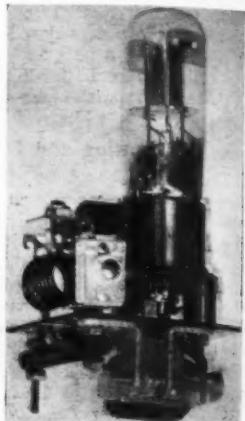
The second drawing shows the compressed charge in the crankcase passing through the by-pass port where it strikes a baffle and is deflected upward to prevent it from escaping out the exhaust port, which is in a direct line with the by-pass port. The exhaust gases, however, still at a higher than atmospheric pressure rush out the exhaust port. Some designers use a long exhaust pipe, which acts as a sort of siphon. Others state this same siphoning action may be powerful enough to draw some of the incoming gases over the baffle and out the exhaust port causing poor volumetric efficiency. An exhaust pipe from one and a half to two times the bore should be sufficient. The four phases of operation in the two-stroke are completed as follows: intake into crankcase, passes through the bypass, is then compressed, fired and exhausted all in two strokes of the piston.

The Diesel was invented a few years after the advent of the two-stroke by Dr. Rudolph Diesel. This engine successfully uses either the two-stroke or four-stroke cycle. It employs what is sometimes called the "spontaneous ignition" principle. Air is drawn into the cylinder and compressed to approximately 500 lbs. per square inch. At this high pressure the heat is intense enough to ignite the fuel, usually crude oil, which is injected near the top of the compression stroke.

The gasoline two-stroke lends itself admirably to model aircraft design, both as to weight and size. However, the Diesel two-stroke, with its high thermal efficiency, when presented to the model world, will probably be outstanding due to the lack of accessories such as ignition and valve gear. Until then let us concentrate on gasoline power. Much can be written relative to miniature two-stroke design, but space does not permit a too detailed description of design and construction. The following will start the model thermo-dynamic engineers on their way, and perhaps also bring a comparatively new and very instructive art to model aircraft engineering.

RADIO Control

To fit
the Ship
you now
have



Shown above is a complete receiver for use in the airplane constructed from our \$9.00 kit which includes everything except tubes, batteries and escapement motor. Total weight including the tube as shown above is 5 1/2 ounces. With all controls set on the switch even the small ship can lift. Use this control for a timing escapement motor, on off motor when desired, rudder control, spark control, etc.

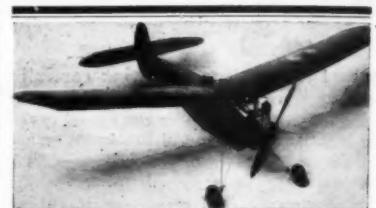
Send for our new book giving all the dope on several different methods of control, price 25c.

We still make the world's best ignition coils and your dealer will be pleased to supply one for you on the next engine if so requested.

NATHAN R. SMITH MFG. CO.

1814 West 8th Street

Los Angeles, Calif.



THE PRECISION

WING SPAN 5 FT.
WEIGHT 3 LBS.

★ Complete Kit including 3 1/2" Streamlined Air Wheels, precision cut parts, ready-cut ribs, bulkheads, motor board, etc. Also rust proof landing gear wire.

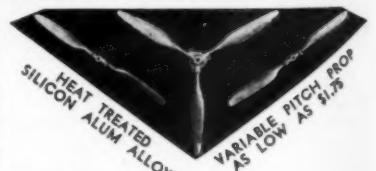
★ This plane features a complete movable motor mount and a full shock absorbing landing gear.

★ The PRECISION is designed especially for contest work. It has the climb of a rocket and the glide of a gull yet is strong enough to take the hardest knocks. **\$5.50 POST-KIT less motor**

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Featuring
Expert design insuring aerodynamic efficiency. Precision machining insuring perfect track and balance.

Blades threaded in hub and held in place by clamp nut for positive pitch variation.

A SIZE FOR EVERY MOTOR
10" 12" 14" 16" 18"
2 Blades 3 Blades
\$1.75 \$2.00

Extra Blades 60c Each
Special Introductory Offer

Through our affiliations with a leading model shop we can offer \$1.00 discount on each propeller ordered with any standard motor at regular price.

ROYAL STANDARD PROPELLERS
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Crankshaft

The crankshaft converts a reciprocal action into a rotary motion. For simplicity a single bearing type is recommended. The material used is either tool steel or cold rolled steel. For ease of construction, (tool steel should be hardened, drawn, then ground, necessitating complicated equipment.) Cold rolled steel is best. The shaft may be either machined from the solid or built up by brazing. Cold rolled steel rods have a hard skin due to the straightening process. This should be machined off and the shaft permitted to "rest" a few days to restore the fibers to their natural tension. The final cuts may then be taken, using kerosene as a tool bit lubricant without fear of distortion. Two or three radial grooves may be cut with a "V" tool about $1\frac{1}{64}$ " deep on the bearing surfaces to aid in their lubrication. To insure accuracy and a good finish, the shaft should be lapped with an external lap as shown in Fig. 3. To do this use a fine carborundum, or tripoli and oil mixture, then finish with rouge and kerosene. Some builders drill a hole longitudinally in the shaft, as long as the bearing surface, to lighten it. A small aluminum plug may be inserted afterwards to help decrease crankcase volume. It may also be a good idea to case-harden the shaft before lapping. The general dimensions should be as follows: diameter of bearing surface to equal 40% of the bore or stroke, whichever is greater. The length of a single bearing shaft's bearing surface is about four times the diameter.

Balance

A single crank, one cylinder engine, cannot be perfectly balanced due to the law of dynamics which reads as follows: "A revolving body will not balance a reciprocating body due to the speeds in relation to one another varying." However, were a designer of a model engine to forget balance entirely, he would have not only the dynamic forces described above but also the static forces created by unbalanced weights. The following are two common methods used to balance a motor statically:

1/2 weight of piston (complete).

1/2 weight of small end of connecting rod.

1/1 weight of large end of connecting rod.

Total—counter-weight on shaft.

Another way is to attach the completed reciprocal parts to the shaft and balance on a knife edge. It is advisable to make these reciprocal parts as light as possible because the power required to start or stop a weight varies as the square of the speed. This excess weight may not mean much at low R.P.M., but at high speeds the increase is so great much of the available power is used to start and stop the reciprocating parts. Undue strain on bearings and parts will also result.

Connecting Rod

The connecting rod transmits the reciprocating action of the piston into the rotary action of the crankshaft. If made of dural, the smallest cross-section should be at least $1/30$ of the piston area. If

Ahead of the Field

Besher Models are ahead of the field in design, completeness, and flyability. All our models are of latest design embodying all modern construction of planking, cap stripping, V bracing, and easy construction plans. Quality wood and Berryloid liquids. Flying is proven in every contest flown. Besher Models have been so enthusiastically accepted by Model Builders that in the short space of one year we have had to move to larger quarters. Our new location is a complete building where only these superior models and kits are manufactured.

**Alpha "CORSAIR"
FINEST GAS MODEL**

**\$4.75
P.P.**

A Super Performer In Contests. 5 ft. 8 in. span for 1/5 to 1/3 horsepower motors. Weight 2 lbs. 6 oz. complete. Fits N.A.A. rules. Kit complete with wood, glue, dope, wheels and finished prop.

DeLuxe Kit with Silk for covering and $3\frac{1}{2}$ " air wheels **\$6.50**

Complete Model all built, Ready, and guaranteed to fly. With Brown Jr. Motor, flight timer, guaranteed performance of 2 $\frac{1}{2}$ minutes on 30 seconds motor run... **\$35.00**
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Baby "CORSAIR"

**\$3.00
P.P.**

3 ft. 6 in. wing span for 1/7 to 1/12 horsepower small bore motors. Climbs spectacularly and glides like a soarer. Complete kit with dope, cement, wood, wire, wheels, tissue, etc.

DeLuxe Kit with Silk covering and $2\frac{1}{2}$ " air wheels **\$3.85**

Complete model all built, Ready and Guaranteed to fly with either Husky, Hi-Speed or Ohlsson Motor. **\$30.00**
Speed or Ohlsson Motor.
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**Send 5c for NEW CATALOG
24 Pages of Gas, Rubber, Glider & Indoor Supplies.**

BETTER RESULTS and EASY**STARTING FOR YOUR MOTOR**

New Besher Coil. Weight $2\frac{1}{2}$ oz. specially made will operate on 2 pen cells. Low price and gives hottest spark. Has super insulated high tension lead and 2 clips. Complete with High Tension Lead **\$1.50
P.P.**

Condensers 15c.

CERTIFIED USED MOTORS

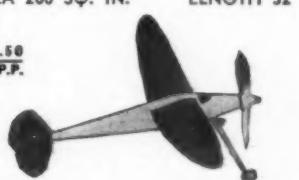
All like new complete with coil, condenser, and spark plug, ready to run, with instruction sheet.

GHO	\$ 4.00	HISPEED	\$ 8.00
BROWN D	7.00	HUSKY	8.00
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OLHSSON (1/2 h.p.)	10.00	SYNCHRO ACE	7.00

The "YANKEE"

WINGSPAN 40"
AREA 200 SQ. IN. LENGTH 32"

**\$1.50
P.P.**



Finest Cabin Endurance Model In Kit Form. A Super Streamline Cabin model eligible for Wakefield Moffet or any N.A.A. cabin contest. Model has planked Elliptical fuselage, Elliptical wing and folding prop. Kit is complete with all wood, cement and planking material and prop block, cut and tapered.

Kit as above but with 80 feet $\frac{1}{2}$ " **\$1.85**
Rubber.

DeLuxe Kit with Silk for covering and Hand Carved 16" propeller and M & M air wheels **\$5.00**

"BRIGADIER"

ENDURANCE MODEL
RUBBER POWERED
27" WING SPAN



75c
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Easy to construct and fly. Flies 2 to 4 minutes. Complete kit with prop, wire, wheels, tissue, wood, cement, rubber, etc.

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Leading dealers throughout the country are featuring the Besher line. We want you to see the value represented in each kit. If your dealer hasn't your favorite model order direct from us.

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Trade in your old motor. We will give you the very best allowance, reasonable shipping and handling. Write for estimated allowance.

MOTOR REPAIR DEPARTMENT.

For \$1.00 we will take apart, overhaul, clean and re-adjust your motor. Replacing of worn or broken parts is done free,

the only charge being for the replaced part. Try us. We are experts.

3 $\frac{1}{2}$ " Air Wheels.....\$1.25

Austin Flight Timer.....1.25

Austin Battery Box, 1".....40

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JUNIOR MOTORS CORPORATION, 2545 N. Broad Street, Philadelphia, Pa.

made of chrome nickel steel, 1/60 of the piston area is sufficient.

The cross-section should be an "I" section or next best, for simplicity, a rectangular section with a ratio of 1:2. If possible avoid circular sections where strength is important. Polish the entire rod with crocus paper to remove all scratches. These scratches under stress sometimes develop into flaws and cause serious damage. The distance between the piston-pin center and the crank-pin center is approximately twice that of the stroke. To lubricate the bearings, a small hole may be drilled on the top of the small end and another on the upper side of the big end facing rotation. Countersink the openings slightly to aid the flow of oil. The center line of the piston and the rod should coincide. This same center line should be as near the crank-throw as possible to bring the reciprocating mass closer to the bearing. Consider the shaft a lever with the fulcrum at the center of the bearing, the propeller equals the weight and the reciprocating mass equals the power. By moving this mass closer to the fulcrum, a shorter leverage is possible; therefore less force, which in turn decreases the wear on the bearing

that should (to obtain highest efficiency) always be "leak proof," is necessary.

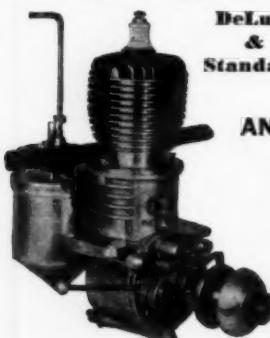
Piston

The piston receives the "kick" from the ignited charge and transmits it to the connecting rod and from there to the shaft. Cast iron is recommended as a material because the co-efficient of expansion (.00000617) and specific gravity (7.207) are ideal for piston material. This metal, being porous, can "pack in" oil and therefore aid on lubrication. To prevent warping after the skin is removed, heat the material to a red heat for at least one hour and allow to cool slowly. This will also help to remove chilled spots which cause uneven expansion due to the difference in texture. To further insure an even expansion, machine the piston all over, leaving the walls slightly thicker near the head due to it being in contact with the hot gases. This excess metal will help to conduct the heat to the oil-cooled skirt without too uneven an expansion. Cut two radial grooves near the head and one near the bottom of the skirt (about 1/64" deep with a "V" tool.) These grooves will pack in oil and aid in compression. The overall length of the piston should be longer than the stroke; so that when the

wrist pin is 60% from the bottom of the skirt the distance between the top of the intake port and the bottom of the by-pass port will be about 12% of the stroke. The baffle is usually 25% to 30% of the piston diameter from the by-pass port side. The base of the baffle should be well-rounded and faired into the piston head to even the flow of gas. Slightly round all sharp edges to prevent a "hot spot" resulting in pre-ignition. The height of the baffle may vary from 0% to 10% higher than the by-pass port. The piston, like the shaft, should be externally lapped and polished, then lapped with a rouge and kerosene mixture into the cylinder. The fit before lapping into the cylinder should be a drive fit and after lapping, a push fit. A piston that slides into a cylinder before running-in, won't hold compression.

Crankcase

The crankcase is usually constructed of aluminum and bushed with bronze to take the crankshaft to facilitate removal of the shaft. The crankcase is split laterally through the center or has a removable front or rear cover. Care should be used to insure a gastight fit in all joints (metal to metal—no gaskets) and that the cylinder mounting is perpendic-



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AN EASY STARTER

A motor radically different, of clean design and rugged construction, hardened crankshaft—hardened piston—hardened piston pin—steel drop forged hardened connecting rod—one piece cylinder—foolproof ignition system.

Specification
Bore, .900"; stroke, 31/32"; R.P.M., 10,000;
H.P., 1/5 plus; Weight, bare, 7 1/2 oz.;
Height, incl. plug, 4 11/16"; Displacement,
.618-10 c.c. Factory tested and guaranteed.

All motors complete with coil, condenser, etc., ready to run.

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lar to the shaft bearing, otherwise undue wear will result. A good finish can be obtained on aluminum by lubricating the tool bit with turpentine. Lap the shaft and the main bearing together, after reaming, using only heavy oil as a running-in medium. Anything else may embed itself into the bronze and cause excess wear. To lubricate the main bearing, a hole is drilled at an angle beginning just under the front cylinder mount flange and extending downward to about 40% out from the inside end of the bearing. Due to the proportionately high running temperatures of small internal combustion engines it may prove advantageous to fit the crankcase. This will help to obtain a cooler crankcase which in turn will undoubtedly aid in the volumetric efficiency.

Cylinder

Cold rolled steel will prove quite adequate as cylinder material. Since most aircraft motors are air-cooled, it is necessary to increase the external area of the cylinder that is in contact with the air-stream. This is accomplished by adding fins. These should be spaced so that the distance between them is about one and a half to two times the thickness of each fin. Better cooling can be obtained if the fins are tapered.

Since heat is the energy used to power internal combustion engines, a cylinder with thin walls will have a tendency to dissipate the heat too rapidly, causing distortion and lack of power. A 1/16 to 3/32 inch wall on a 15 cc engine is considered a good proportionate thickness.

Lap the bore with carborundum or tripoli then rouge, with an internal lap as shown in Fig. IV. Before lapping, the ports should be accurately located and drilled. When filing the ports, a piece of case-hardened cold rolled steel, a slide fit in the cylinder should be used as a guide to prevent filing the ports beyond the limits of the timing and to help keep them square with the bore.

The intake manifold and by-pass cover may be brazed in position, or the cylinder may be so constructed as to incorporate facilities for fastening these accessories with machine screws. Still another method is to clamp an aluminum ring around that part of the cylinder containing the ports, and attaching the intake and by-pass cover to this. Round off and polish all corners in the passages to aid the flow of gas. Plot the length of the cylinder so that the bottom is flush with the bottom of the skirt of the piston and the top of the cylinder far enough away from the piston head to permit an approximate compression ratio of from 4 to 6.1. A higher compression than this will cause more starting trouble than the few added R.P.M. are worth. High compression may be all right when using a flywheel, but if your motor misses in the air a propeller isn't heavy enough to carry the piston through a high compression stroke.

Timing

Fig. V illustrates a timing diagram suggestion by an English model engineer for aircraft engine (15 cc or less) use.

To find the port openings, scribe a circle representing the stroke diameter

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8 in. Wingspan \$4.75
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HEATHE WASP 3 1/2' super-high climb baby gas job	\$3.75
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ALL KITS CONTAIN:

Full size plans and printed sheets, cement, dope, hardware and ignition equipment. ALL KITS GUARANTEED PERFECT. ALL KITS SENT POSTFREE.

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(with degrees marked off as shown in the drawing), and cut this with a transversal connecting the midpoints of the arcs. It is now only necessary to set your dividers at twice the stroke and mark off the ports on half the transversal.

Carburetor

The carburetor mixes the gas and the air to suitable proportions for combustion. A typical carburetor and one recommended for small internal combustion engines is shown in figure VI. The diameter of the intake tube should be about 1/4 to 1/3 the bore. The flare at the end of the air intake side will cause a greater volume of air to flow past the jet, increasing the speed of the flow and therefore decreasing the pressure. Since a float carburetor isn't usually used, the gas level is never where it should be, slightly below the jet opening. The lower pressure therefore acts as a suction in

drawing the gas from the tank through the jet.

Breaker Assembly

The comparatively low speed of the airplane engine as compared with the marine engine eliminates the possibility of the breaker points "floating." This means that at high speeds the points don't close every revolution as they should, due to the fact that the average spring action assembly isn't positive acting. This will cause "stuttering" and continual missing. A good formula to remember is: the distance from cam to point, and from cam to pivot, should be about one to two. Another type of breaker assembly is—a fibre case with one brass segment, and a revolving brush to make contact. A breaker of this type can be made very small and entirely enclosed. For best results, the entire assembly should be able to be rotated around the shaft in order to advance or retard the spark, which, in a two-stroke, usually occurs about 30-45 degrees B.T.D.C. The flat on the cam is about ninety to one hundred degrees of a camshaft revolution.

Servicing A Commercial Engine

After the engine has been entirely dismantled, the parts should be placed in a pan of thinner and left to soak for three or four hours. This, with the help of a toothbrush, will remove all the stains and grit. Dry the parts with an air hose or a clean linen cloth. Remove all burrs, caused by using a poorly ground screwdriver, from the machine screws—either plate them or hold them over a clean flame until they turn blue, then quench in water. Before assembling renew all gaskets and if possible polish the port passages with small dental burrs. If the connecting rod is cast and has enough material left, machine or file it all over and polish with crocus paper. Sometimes the rod is made from a heavy material such as bronze or brass. It would be advisable in a case of this sort to construct one, using the same dimensions as the original, of duralumin. Clean the spark plug and

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breaker points and adjust them to the engine's specifications. Assemble the engine, using a good grade of oil on all bearing surfaces, but take care not to "slop" the oil all over the outside of the now clean engine. Grind your screwdriver to fit the screw slots and a neat assembly job will result. Paint the cylinder and spark plug case with a dull black cylinder dressing; following carefully the instruction on the can. To further dress up the engine, purchase an acorn nut the correct size for the crankshaft threads. This does away with the unfinished front most engines seem to have. The next step is to put on an oversized hat (if necessary) and show your new (?) engine to your fellow modelers.

The Stout Indoor Trophy Winner

(Continued from page 9)

from the center, increasing again to 1/16 inch by 3/32 inch 6 inches out from the center, then decreasing to 1/16 inch in diameter 2 inches in from the point of attachment of the wire brace.

The cross section then increases to a maximum of 1/16 inch by 1/8 inch at the point of attachment of the wire, and tapers off to 1/32 inch in diameter at the tips. Where one of the foregoing dimensions is greater than the other, the spar is understood to be set on edge; that is, with the longer dimension vertical. Wherever the spar is not round, it is sanded to an oval cross section. The two sections between the center and the brace which are 1/16 inch in diameter are made thin because very little bending occurs there. Such places are known as "points of inflection" in beam theory. Wing ribs are 1/64 inch square in cross section. The camber of the airfoil is slightly lower than that commonly used, because this appears to be the best practice for very light ships.

Weight of the completed wing frame, with clips but no covering or bracing, is .019 ounce. It is covered with microfilm before the tungsten wire is attached. It is absolutely necessary to attach the brace wires from both the front and rear spars to the front wing clip, as is shown in the plans, in order to prevent twisting of the tips.

There is a single brace wire on top of the front wing spar, which only comes into play in pulling the plane out of a dive. If the model is flown in a hall large enough to avoid hitting obstructions, this top brace may be omitted. It is a good idea to glue a piece of 1/64-inch square aluminum about an inch long in the front lift wire on the left wing to provide for adjustment on the wash-in and wash-out of the tips. The two tips may be washed in or out simultaneously by moving the front wing clip back and forth on the motor stick.

A microfilm propeller was used on the winning flight of the model. The type shown is as efficient as a good wooden propeller and weighs only .011 ounce. It was made by building the blades on a block carved to the correct helical shape. Pitch is the same as that of a wooden prop carved from a block 1 inch by 1-1/2 inches by 15-1/2 inches. Blades

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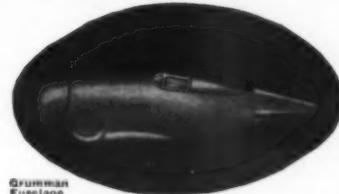
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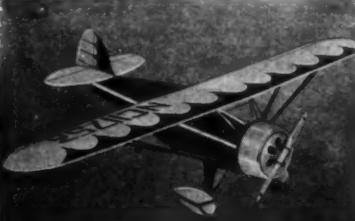
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1x2, each.....	1/16, 1/8, 1/4, 1/2, 1"..... 30¢	1/32"..... 40¢
1x3, each.....	1/16, 1/8, 1/4, 1/2, 1"..... 40¢	1/64"..... 50¢
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2x3, each.....	1/16, 1/8, 1/4, 1/2, 1"..... 40¢	1/32"..... 80¢
2x3, each.....	1/16, 1/8, 1/4, 1/2, 1"..... 40¢	1/64"..... 90¢
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2 oz. bot. ds. 65¢	WASHERS	1/64"..... 130¢
2 oz. bot. ds. 65¢	1/16"..... 140¢	1/32"..... 140¢
1 pt. 40¢ 1 qt. 1.75	1/8"..... 150¢	1/64"..... 150¢
CLEAR DOPE	ROPE	1/32"..... 160¢
1 oz. doz. 33¢	.002 thick 5' 35¢	1/64"..... 170¢
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are covered on both sides to insure an efficient prop.

Another feature of this model which may require some explanation is the flexible music wire thrust bearing. High wing indoor ships in which the thrust line passes well below the center of gravity tend to be longitudinally unstable. Mr. Charles H. Grant explained this effect in his "Aerodynamic Design of the Model Plane" series in MODEL AIRPLANE NEWS and showed that one solution would be to tilt the motor stick to bring up the thrust line.

Some builders unwittingly overcome this difficulty by using a sufficiently flexible motor stick which bends at the start of the flight and gives the prop enough down-thrust to overcome any stalling tendency. When a rigid braced stick is used, however, the thrust line is in the same position throughout the flight. If the model is adjusted to fly level correctly, it will stall at the start of the flight; if it is given down-thrust to prevent stalling under power, it will fly too fast or even dive at the end of the flight.

This tendency is overcome here by use of a flexible thrust bearing, which bends under the tension of the rubber and gives the propeller down-thrust at the start of the flight. If some difficulty is experienced in getting the right amount of change in the thrust line a bit of experimenting will solve that. The original craft worked well with a bearing of .014 music wire with a single loop 1/16 inch in diameter as shown in the plans.

Upon completing construction of the trophy winner, you may be anxious to fly it but have no nearby armory or hall available. Have you a large room? Fine, then watch the next issue of MODEL AIRPLANE NEWS. We'll present a sure-fire method of computing the potential duration of your plane after making gliding tests. In the meantime keep the cat away from the microfilm . . .

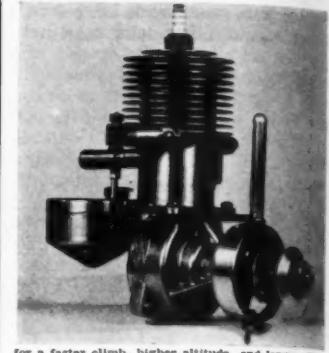
The Physics of the Airplane

(Continued from page 27)

plane controls. These bearings are self lubricated and can be self-aligning over a limited displacement. The self-aligning bearings assume a limited amount of distortion without a decrease in the frictional efficiency. In the example of control surfaces, this supplements the movement of large control surfaces and contributes safety when the moving surfaces may be seriously overloaded for limited durations of time. See Figure 1.

While friction is detrimental in many instances, yet without friction insufficient traction between the tire and the runway would be developed so that the airplane could taxi forward, gain speed and finally take off. Also in the act of landing, the reverse may be said as being true. The runway of the airport offers a certain degree of friction to the rolling airplane with the result that within a moderate distance it stops rolling of its own accord. If the airplane is equipped with brakes, it will be found that these brakes are especially equipped with brake shoes which have a composition lining of high friction characteristic which develops a large

MORE POWER is the need,



for a faster climb, higher altitude, and longer glide. Champion model flyers are making use of which airplane designers have long been following—to get greater power—greater power. With the extra power of the improved 1935 FORSTER you are a step ahead of competition.

FORSTERS have won many first places, not alone in the power contests as well—in contests limited to ships of 41 1/2 foot wing span. Does this prove anything to you?

A FORSTER is the perfect power plant for large classes. The 1935 M. A. A. engine is recommended for models from 1 to 16 feet wingspan. Displacement, .997 cubic inches; 1/2 horse power weight bare, 14 ounces.

With power and reliability, the only thing that counts at contests. Complete, tested at the factory, ready to run..... \$27.75

See your dealer or write us today.

FORSTER BROTHERS
519 Lake Street
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HAWK MODEL CO. 3521 West Fullerton Avenue, Chicago, Illinois

A NEW FLYING WING

GI-RO, Model T

Aviation MOVES!

Huge liners span the seven seas! Yesterday's "crates" have changed to "dreamships." "Windmill" autogiros are now flying-autos; tomorrow—individual whirling wings for air-minded millions whose only dreamships are

MODEL T'S OF THE SKY

GI-RO is a "natural" model for universal rotary wings; a paradox of basically simple design, but highly complex and effective aerodynamics. Automatically varying incidence and dihedral coordinating with sweepback, wing pressure movement and centrifugal-gyrosopes are characteristics, peculiar to GI-RO, partly accounting for the "whirligig's" amazing airworthiness.

You'll thrill to see this sleek new GI-RO, spinning, silently floating—reducing rotary soaring to scientific essentials, seemingly alive in its natural element.

Who knows but YOU may add power to GI-RO principles, so that air-minded MODERN "airmen"—taking off from their own back yards, may top the mythical sun-circling exploits of Icarus.

Darting, whirling, gracefully banking and soaring, GI-RO presents breath-taking possibilities of undreamed flight-freedom; a dazzling horizon of aviation-worlds to conquer—a challenge to your pioneer spirit—the spirit of flight.

Aviation MOVES!
GI-RO, Model T Kit 50c Postpaid
SUN AERO CO.

954 Eddy St. San Francisco, Calif.

Get a CADET STARTER

Kicks engine over at running speed every time. Saves fingers, saves engine. Powerful, free wheeling spring device lets go when engine starts. Lasts a lifetime. At your dealer or send \$3 to Cadet Model Co., 1220 Airway Glendale, Calif.



get going

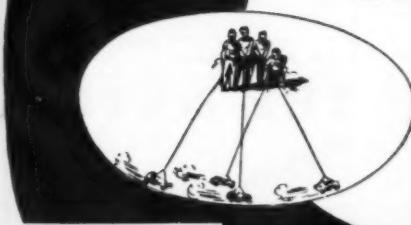


PHOTOS BY VANCE HANCOCK

with the WASP SPECIAL

\$19.50

Complete INCLUDING
Special Phantom Engine,
Coil, Tank, Condenser
and Fly Wheel



The Wasp Special may be run in a straight-away, or in a 15-ft. or larger radius for circle competition. Complete racing instructions furnished.

At last, the COMPLETE RACE CAR, PACKED WITH POWER

Step out in front with this super powered midget-type race car that you can operate anywhere within a 15-foot radius!

The Wasp Special gives you everything—speeds from approximately 5 to 40 m.p.h.—good looks that reproduce Pat Cunningham's famous midget racer—dependability and economy that are built in by careful engineering—and a complete kit, engine included, at a price you can afford to pay!

The Wasp Special is E-A-S-Y to build. There are no complicated assemblies to figure out . . . no difficult body curves to reproduce. Without special skill you can complete the Wasp in two evenings, ready to run.



Get this perfected kit today and challenge the world. Your Wasp Special is small enough for backyard or street operation, yet it is packed with power to meet all competition. Fill in the coupon NOW. Mail it TODAY and be FIRST with the LATEST.

SPECIFICATIONS

Overall length, 14 in.; overall height, 6 $\frac{1}{4}$ in.; overall width, 7 $\frac{1}{4}$ in.; weight, 2 lbs. 9 oz.; special Phantom race car engine built up for strenuous race car use, with clean air intake; aluminum exhaust pipe with fittings; special snap-in battery carrier; special metal condenser; front wheel friction drive (1.75 : 1 ratio) with machined steel clutch plate and fly wheel; prefabricated rear axle assembly ready to mount (adjustable to control car's direction); 2 $\frac{1}{2}$ in. pneumatic tires and wheels; selected hardwood ash frame; body parts cut to shape with all holes drilled; paint; dope; complete full scale plans, and racing instructions.

BUY DIRECT—We Have No Dealers

Wasp Model Supply

4128 Wade Ave., Venice, Calif.

Please rush prepaid one complete WASP SPECIAL race car kit with special Phantom engine, as advertised, for which I enclose P. O. Money Order for \$19.50.

Send me full scale plans for Wasp Special race car. Enclosed is \$1.00 Money Order which will be deducted from complete kit price if I order kit within 60 days.

Name _____

M4

Address _____

amount of friction per square inch of contact with the brake drum. In the servo brake, the friction force, through an ingenious application of design, is made to further actuate the brakes shoes and thus generate a greater degree of friction through an increase in the application of the braking force. Another typical example of beneficial friction may be found where a nail or escutcheon pin or wood-screw is forced into the plywood under the impetus of hammering or screwing action. The friction holds the nails and screws in place, thus performing a useful function. See Figure 2. This illustration shows the friction clutch of an aircraft engine magneto as it connects to the auxiliary drive of the airplane engine. Figure 3 shows a typical airplane landing gear brake.

Where a mechanical device is used to perform some specific task of work, it is of interest to determine just what the efficiency of the machine is under the action of performing work. This efficiency is the mechanical efficiency and is defined as the

ratio of the work done by the machine, to the amount of work done on the machine. This kind of efficiency may be taken as a function or ratio which exists between the output and the input of the machine. In airplane design, the lift-to-drag ratio may be said to be similar in exemplary form. In the case of the average airplane, the efficiency is comparatively high when compared to other mechanical devices.

Although machined surfaces in contact to each other present a minimum of friction, it is customary to lubricate moving parts in contact with each other, where the slightest semblance of sliding friction is present, by means of a viscous liquid. This is simply oil or a derivative of oil. The theory which governs this procedure is based upon the fact that a slight film of oil is retained on the surface and this reduces the friction between the two sliding parts. Thus the actual sliding takes place on a film of oil. The sliding friction of the two films of oil is very low and as a result, sliding friction is minimized.

Liquids and gases are also subjected to and capable of presenting frictional forces. We find this to be true when a liquid flows through a pipe line such as a fuel line, or oil in an oil line. Where the inherent pressure is high, as in the case of forced feed oil lines under pressure, the pipe diameter is made large. The liquid is subject to motion while the walls of the fuel line remain stationary and thus sliding friction is present. This means that there is a large degree of internal friction between each particle of the liquid due to the viscosity of the liquid. Oils and other gummy lubricants have a high viscosity value. High viscosity simply means that forces in the liquids arise in such a direction as to oppose the flow. Gases act much in the same way. In fact, the friction of the carburetted mixture in the induction lines of the internal combustion gas engine rises to a considerable value, hence short induction lines are imperative. For this reason as well, the induction lines of the supercharger blowers are made short and as compact as

cold facts...

"Nor can the cold of Winter, stop the G-9 on its steady flights."

From a cold country town in Massachusetts we received this unsolicited testimonial:

"I purchased one of your G-9 motors at the Jordan Marsh store in Boston and have been flying it in my model, with skis. Starts instantly, and the freezing weather does not interfere with its performance."

Weight Bare—9 oz.

with gas tank

H. P.—1/5 plus

Bore—7/8"

Stroke—15/16"

R.P.M.—from 300 to

7,000 with 13" prop.



Over
10,000
with
flywheel.

Complete, mounted on
test block, with Cham-
pion spark plug, coil and
condenser. U. S. A. only

Made for performance—not show—no fancy
geegaws for eye appeal, but—careful and ac-
curate machining for stability and power.

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PP

Motorize Your Models



(planes, trains or
boats) with a
**MINI-ELECTRIC
MOTOR**

operates on AC or DC
current—3 to 6 volt.
Ht. 2", Width 1 1/2",
length 2 1/4". Wt. 4 oz.
Can be used for small

bench work, polishing, buffing, etc.

\$1.00 each postpaid

Other sizes and model accessories:

Wt.—1 oz.	Ht. 2"	length 2 1/4"	ea. \$1.25
Wt.—7 oz.	Ht. 2 1/2"	length 2 1/4"	ea. 1.50
Wt.—10 oz.	Ht. 3 1/2"	length 2 1/2"	ea. 1.75
Wt.—11 oz.	Ht. 3 1/2"	length 2 1/2"	ea. 2.00
Small universal joints—1/8-3/16" 1/4 holes.			ea. .35
Large gas model joints—1/8-3/16" 1/4 holes.			ea. 1.00
Stuffing Boxes, small boats—1/8 or 3/16"			ea. .65
Large Brass Stuffing Boxes—3/16 or 1/4"			ea. 1.50

IMPNUMAT BALLOONS

No blowing up—nor blowing out—insures easy take off and happy landings—size 3 1/2" x 1 1/2"

\$1.25 per pair



**FLYWEIGHT
CHAMPION
COILS**

\$2

A hot spark is guaranteed under all conditions—on dry
weather—2 lbs. oz.—but has
proven it can operate an outboard engine—
cast of molten aluminum—
has no fancy trimmings on this coil,
that is why our price is so low. Complete
with high tension lead.

COVER YOUR NEXT MODEL WITH

**3 SHEETS
(24 x 36)**

25c p.p.

Pervel
the sixth fabric

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possible.

Perhaps the basic reason for the appearance of the modern airplane is predicated by the friction of the air in which it flies, or what may be termed the skin friction and friction to the movement of the entire airplane. We find that skin friction is of great importance when an investigation is made concerning the effect of exposed rivet heads upon airplane performance. Any excrescence which exists on a metal or fabric-covered wing frame, tends to increase the friction and thus lower the performance. The general drag of the airplane is a function of the resistance of the particles of the mass of air to displacement. This resistance to displacement is a function of the inertia of each particle to sudden displacement of its relative position in respect to the general mass of air particles.

It has been found that by designing the geometrical dimensions of airplanes in such a manner that they conform to streamlines, or the lines of least resistance, that the resistance of the air or the drag to the swift flight of an airplane is substantially reduced. The development of streamlining is a product of wind tunnel research along these lines. Only by a high degree of streamlining has it been made possible for the modern airplane to achieve phenomenal airspeeds on moderate power. Upon a further inspection of the modern airplane, we note that the general lines are such that any arresting of the airflow is assiduously averted. This tends to overcome the inertia of the air slowly in contrast to flat surfaces, with the inevitable result that the drag is lowered. Fillets and other fairings of secondary nature which are disposed between two surfaces exposed to the air stream at an angle to one another, are artificial methods employed to reduce the drag.

Thus we find that friction is a pertinent part of the science of aerodynamics in that it can be both beneficial and detrimental. Exposed rivet heads contribute about one per cent of the drag of a metal wing. Although we consider friction in the light of a troublesome factor ordinarily, there are a few engineering applications which we have shown for using friction in a beneficial sense. Figure 4 shows the installation of pivoted counterweights on the crankshaft of a radial engine for airplane use. The surface friction of the counterweights, supplemented by their inherent tendency to lag behind the natural period of rotation of the crankshaft proper, smooths out the running characteristics nicely and prevents the occurrence of "rough spots" in the performance of the involved power plant. The

New York Prices For The Northwest

Northwest builders—our central location saves you two or more days on delivery. 3 hour service! We guarantee our materials to be the best on the market for the prices. If you aren't satisfied with your order, return it at our expense and your money will be refunded. Our 4 point policy protects you all around.

Lowest Prices Money Back Guarantee 8-Hour Service Free Postage

	TISSUE	WIRE
1/8" flat 15'.....	8c	.030
225" skein.....	5c	.040
1/16" flat 15'.....	6c	.035
1/16" flat 12'.....	5c	.035
225" skein.....	.75c	1/16x60'-10c 1/32x60'-12c 1/64x60'-15c

	STRIP	THROTTLE
1/8" STRIP		
BALSA	19c	18c
1/16" STRIP	19c	18c
BALSA	19c	18c
1/32" STRIP	19c	18c
BALSA	19c	18c
1/64" STRIP	19c	18c
BALSA	19c	18c
1/128" STRIP	19c	18c
BALSA	19c	18c
1/256" STRIP	19c	18c
BALSA	19c	18c
1/512" STRIP	19c	18c
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1/1024" STRIP	19c	18c
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BALSA		

	WHEELS	SPINDLES
1/8" WHEELS	per pr.	each
balsa, balsa, celu.	1/2" .01 .02	1/8" long .020
1/16" WHEELS	1/2" .04 .05	.030
1/32" WHEELS	1/2" .06 .08	.040
1/64" WHEELS	1/2" .08 .10	.050
1/128" WHEELS	1/2" .10 .12	.060
1/256" WHEELS	1/2" .12 .15	.070
1/512" WHEELS	1/2" .14 .18	.080
1/1024" WHEELS	1/2" .16 .20	.090
1/2048" WHEELS	1/2" .18 .22	.100
1/4096" WHEELS	1/2" .20 .24	.110

	SWITCHES	CONDENSERS
3/16" SW.	each .25	each .25
1/4" SW.	each .30	each .25
1/8" SW.	each .35	each .25
1/16" SW.	each .40	each .25
1/32" SW.	each .45	each .25
1/64" SW.	each .50	each .25
1/128" SW.	each .55	each .25
1/256" SW.	each .60	each .25
1/512" SW.	each .65	each .25
1/1024" SW.	each .70	each .25
1/2048" SW.	each .75	each .25
1/4096" SW.	each .80	each .25

	SWITCHES	CONDENSERS
3/16" SW.	each .25	each .25
1/4" SW.	each .30	each .25
1/8" SW.	each .35	each .25
1/16" SW.	each .40	each .25
1/32" SW.	each .45	each .25
1/64" SW.	each .50	each .25
1/128" SW.	each .55	each .25
1/256" SW.	each .60	each .25
1/512" SW.	each .65	each .25
1/1024" SW.	each .70	each .25
1/2048" SW.	each .75	each .25
1/4096" SW.	each .80	each .25

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1/2048" SW.	each .75	each .25
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1/2048" SW.	each .75	each .25
1/4096" SW.	each .80	each .25

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1/64" SW.	each .50	each .25
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1/64" SW.	each .50	each .25
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1/1024" SW.	each .70	each .25
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1/8" SW.	each .35	each .25
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1/64" SW.	each .50	each .25
1/128" SW.	each .55	each .25
1/256" SW.	each .60	each .25
1/512" SW.	each .65	each .25
1/1024" SW.	each .70	each .25
1/2048" SW.	each .75	each .25
1/4096" SW.	each .80	each .25

	SWITCH

tendency to lag slightly out of phase is designated by the engineering term of "hysteresis." The rubber block clutch for the airplane engine magneto also acts in this manner, to some extent.

NOTE—In article 1 of this series, on pages 38-39, printed in the August issue, there is an equation given concerning acceleration. The exact figures are as follows:

If the take-off speed of some airplane is 50 m.p.h. and two minutes later it has attained an air speed of 70 m.p.h., what is the acceleration experienced by the airplane?

Proof: $\frac{70-50}{2}$ converting into

$\frac{36,600-26,400}{120}$ is equal to 105,600 equals

120 f.p.m. Since the term 120 is equal to two minutes, this latter figure is in minutes. The expression 105,600 f.p.m. is divided by 60 to reduce it to feet per minute total acceleration over a period of two minutes. This is further divided by 2 to reduce it to an average f.p.m. A further division is equal to:

890 or 14.67 f.p.s.

60

This latter figure reduces the formula to feet per second average.

A further and more direct definition of acceleration is as follows:

When an object falls, the force acting upon it to pull it towards the earth is the force of gravity. In a vacuum where there is no air resistance, a falling object achieves a 32 f.p.s. gain in velocity each second it is falling. The acceleration is constant. In the air, the resistance of the air is opposed to accelerating force (gravity), and since air resistance (drag) increases as the square of the velocity, a speed will soon be attained when the resistance (drag) will build up equal to the acceleration force (gravity). The acceleration ceases, and the velocity becomes constant. Thus, in the air, acceleration gradually decreases to nothing as the air resistance (drag) builds up to neutralize the accelerating force.

In an airplane in level flight, the accelerating force is the thrust of the propeller. As long as the thrust delivered to the propeller by the engine is in excess of the drag of the airplane, the speed increases (accelerates). As the speed of the airplane increases, drag builds up until it is equal to the thrust and the (constant) flying speed is reached.

Note: Mr. Lawrence L. Price of St. Petersburg, Florida, has volunteered the above definition of acceleration and the addition to the original equation given in the above mentioned article. The authors of this series extend to him appreciation for his interest in this matter and his own contribution.

They Say "the Pursuit" Is Dead (Continued from page 7)

radial motors. Commenting on this, Maj. Gen. Arnold told newspapermen at Wright Field that the introduction of bi-motored ships into the pursuit class is expected "to open broad new performance possibilities and to give advantages impossible with single engined planes."

Other important innovations include a



Judged on engineering features alone you will discover what experts have proven—the winning combination that is a Bunch motor.

You can now satisfy yourself with something better—an engine designed and specified by Bunch Engineers, for service in an airplane, speedboat or race car.

For fewer dollars than ever before you can power your models with the World's smallest, sturdiest, most reliable 1/5 h.p. engines. Select a Bunch engine and gain the performance of motors built to tested specifications.

PROVEN CONSTRUCTION FEATURES

CYLINDER—An outstanding Bunch development is the one piece all steel cylinder. The cylinder wall; cooling fins; streamlined finned head; by-pass and intake parts* are all fabricated into one leakproof cylinder unit. There are no gaskets or bolts to tighten and distort the accurately machined cylinder wall. Power ported for greatest efficiency Bunch cylinder construction permits an unequalled power output per cubic inch displacement.

*The Gwin Aero and Speedway engine exhaust stack is also integral with cylinder.

PISTON AND PISTON RINGS—A "diamond ground" aluminum alloy piston is fitted with two centrifugally cast piston rings. Scientifically proportioned* these rings are as deep as they are across the face. They "seat" or seal compression while block testing and build power and improve as an engine is kept in service.

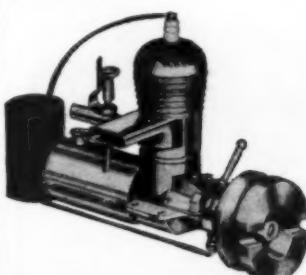
*Unusual power is developed because the compression seal with Bunch engines is dynamic; most effective at high speed when operating pressures fully seat the piston rings. Since the piston is not lapped to the cylinder wall there is no piston drag or piston wear.

CRANKCASE ASSEMBLY AND CRANKSHAFT—A bronze main bearing is cast directly into the one piece machine cast aluminum alloy crankcase and is pressure lubricated through a hollow drilled nickel steel crankshaft.

The compact timer assembly is efficient at all speeds. Point gap is quickly adjusted and points easily cleaned without removal of engine parts. Use of a handy control arm sets timer in any degree of advance or retard. The timer assembly is held securely with a self-locking marcel spring.

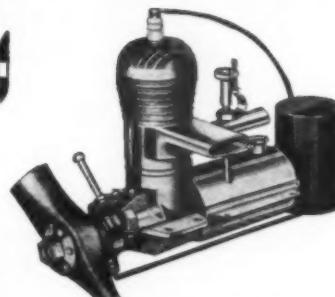
MECHANICAL SPECIFICATIONS

Bore $\frac{7}{16}$ ", Stroke $\frac{3}{4}$ ". Displacement 45 hundredths cubic inch. Horsepower 1/5 at 5200 R.P.M., $\frac{1}{4}$ at 8500. Height overall $4\frac{1}{4}$ ". Crankcase diameter $1\frac{1}{4}$ " O.D. Bare engine weight $6\frac{1}{2}$ oz. Engine rotation counter-clockwise, except Speedway. Engines and kits complete with coil, condenser, spark plug and all metal fuel tank. Engine kits have all bearings, piston and rings fitted and timer assembly set up.



SPEEDWAY Race Car Engine

Assembled \$14.00
Kit 11.85



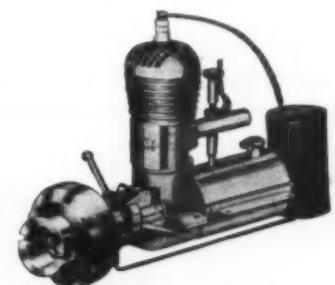
GWIN AERO Aircraft Engine

Assembled—Upright \$12.00
Assembled—Inverted 12.50
Kit—Upright or Inverted 9.85



MIGHTY MIDGET Aircraft Engine

Assembled—Upright \$9.50
Assembled—Inverted 9.75
Kit—Upright or Inverted 7.85



MIGHTY MARINE Speedboat Engine

Assembled \$12.50
Kit 10.85

BUNCH MODEL AIRPLANE CO.	
5009 So Hoover St. - Los Angeles, Calif. USA	
SEND THIS ORDER! FACTORY DELIVERY BY RETURN MAIL	
Enclosed find postal money order. Please rush:	
Name _____	
<input type="checkbox"/> Assembled	<input type="checkbox"/> Engine Kit
<input type="checkbox"/> Upright	<input type="checkbox"/> Inverted
Name _____	
Street. _____	City. _____
State. _____	

SENSATIONAL VALUE

\$9.95

At Your
Dealer



SYNCRO DEVICES, INC.

523 BOYDELL BLDG.
DETROIT, MICH.

Syncro ACE Special

The enthusiastic reception of the new Syncro ACE Special, announced last month, has surpassed our fondest hopes! Production has been stepped up to insure prompt delivery. Model builders like the performance, and the fact that its design permits either vertical or inverted mounting without dismantling. Parts are interchangeable with the famous SYNCRO ACE.

Ask Your Dealer

Have him show you this little engine. Compare it with anything yet developed. Order at once.

Introducing Miss WORLD'S FAIR

SPECIFICATIONS

- Wingspan 48"
- Overall length 28"
- Weight with motor 21 oz.
- A small bore gasmotor designed for sensational climbing and extra flat glide.
- Super structural design for strength and durability.
- Conforms with all weights and specifications of contest rulings.

CONTENTS

- Large bottles of gas model cement, clear dope, and colored dope
- Extra large bundle of special gas model balsa wood strips
- Several sheets of bamboo paper
- Detailed full size plans
- Beautiful insignias for fuselage
- 8 large clearly printed balsa sheets
- Wheels, large sheet celluloid, wire, and many extras.
- NOTHING MORE TO BUY!

Jobbers and dealers . . . write in for our special discounts on this and other kits in the Capitol line.

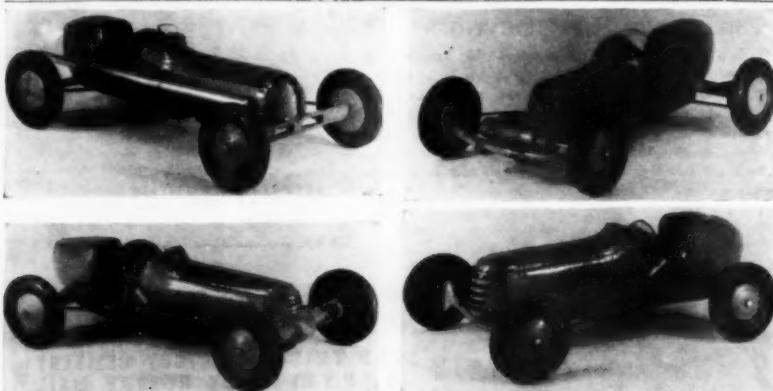
All kits can be obtained at your local dealer . . . if not order direct.

CAPITAL AIRCRAFT & SUPPLY CO., 298 Rogers Ave., Brooklyn, N. Y.

\$2 20
P.P.U.S.A.



Kit does not include power plant



Upper left—Model No. 52—Dirt Track Racer

Lower left—Model No. 53—Front Wheel Drive Racer

Upper right—Model No. 55—Front Wheel Drive Midget Racer

Lower right—Model No. 54—Indianapolis Speedway Racer

Each kit is complete with all material to build the beautiful models shown above. The material is as follows: Saw cut body; Finished drilled wheels; Aluminum exhaust stack (except midget); Tube of cement; Two colors of dope; Brake drums; Celluloid windshield; Material for springs, axles, pans, tie rods and steering rod; a new type improved plan including full size templates, and an instruction sheet fully explaining method of construction and detailing.

The above four models will be sent postpaid for \$1.10. (Please send no stamps. You may buy any one of these models for \$1.00 or less.) Send 5.30 cents for each kit, postage paid, to mail with adhesive tape. **SEND 5.30 COIN FOR CATALOGUE OF COMPLETE LINE AND SUPPLIES.** Be sure to PRINT name and address PLAINLY.

DEALERS! This is the beginning of a new and complete line of model racing cars. Add this fast selling line to your stock now! Write at once!

WORLD WIDE HOBBIES, 2739 South Greeley Street, Milwaukee, Wis.

tricycle landing gear, to facilitate landings and take-offs, and the elimination of one main fuselage. In its place there are two slender spars, or "outrigger," extending from the wing to the double tail assembly. The pilot is housed in a shatterproof glass-enclosed bulge in the middle of the wing. The plane is also equipped with superchargers and pressure devices for sub-stratosphere flying.

Its top speed has not been divulged by the air corps, but it is known that before bringing it east Lieut. Kelsey rocketed the experimental plane through the air at rates well in excess of 400 miles per hour. It is therefore believed to be the fastest fighting plane ever developed by any nation. The world's speed record is 440 miles per hour, set several years ago by an Italian officer in a non-military craft.

Maj. Gen. Arnold reported to observers at Wright Field that Kelsey was flying only at cruising speed on his cross-country hop and that he had the throttle open only to 60 per cent of full power.

The trip was made at high altitudes virtually the whole distance, necessitating the use of oxygen. This was taken to mean, although Lieut. Kelsey did not say at what heights he flew, that he made most of his dash at around 17,000 feet. In conversation at Dayton about this, Gen. Arnold, the air corps chief, quipped:

"He said he would use oxygen from here to New York, but at the rate he has been going he won't have time to think about it before he gets there."

Officers hinted that the XP-38 also has an uncanny lift ability and that certain secret improvements will enable it to climb quickly to great heights and thus serve to intercept fleets of attacking bombers. This is undoubtedly due in part to the tremendous horsepower of the trim craft plus high efficiency of design.

Dubbed "the most perfect example of streamlining yet achieved in aviation," the ship in flight resembles a disembodied wing trailed by two thin rudders. All three wheels disappear into the all-metal fuselages, and sharp, bullet-point spinners encase the hubs of the two tri-bladed props.

Its armament is provided for in the six apertures for machine guns spaced about the part of the nose which juts in front of the pilot's housing. The guns, however, were not mounted when Lieut. Kelsey speeded the ship from coast to coast.

Specifications of the Lockheed pursuit could not be obtained from army officers. They indicated, however, that after it is repaired, it will be returned to Wright Field for further acceptance tests by Materiel Division pilots. They let it be known, too, that it is one of a group of high speed war planes now under construction from which rates of more than 400 miles per hour are expected.

Piloting the new ship on its amazing record trip was not the first time Ben Kelsey made news. Shy, self-effacing, and extremely reticent about publicity, the 33-year-old officer has nevertheless won acclaim on at least two previous occasions.

On Christmas Eve, two years ago, he was flying an army plane home to Wright

Field from New York when flames from an exhaust pipe ignited one wing of his ship just after he had passed Columbus. Electing to try for his home base instead of bailing out, as nearly every other pilot would do, the intrepid officer raced against the blaze for the remaining 70 miles of his hop.

By maneuvering the plane he managed to check the fire to a certain extent, but by the time he reached Wright Field, it had consumed most of the fabric of one wing. Despite that fact he made a safe landing, and then battled the flames.

As a reason for his courageous act he explained that he was bringing his small son an electric train for a Christmas present and he didn't want to abandon the plane because "it would have disappointed the boy." For his heroism he was subsequently given the coveted Distinguished Flying Award, but his citation neglected to mention the Christmas gift factor. It declared that he merited the honor for saving army property at great personal risk.

At the time the then Brig. Gen. Robins pinned the model on him, Lieut. Kelsey smiled graciously and then asked his chief how long he had to wear the decoration. It attracted too much attention, he complained. Robins laughed and ordered him to display it at least the rest of that day.

Last October this same Ben Kelsey climbed unostentatiously into a Curtiss Pursuit plane one morning at Wright Field and took off for Buffalo on what proved to be another record-breaking flight. His average speed for the short jaunt was better than 350 miles an hour, but upon landing he disclaimed credit for having done anything unusual. Other army officers declined to assert that he had set a record but admitted that "it was an extremely fast flight, probably the fastest ever made between Dayton and Buffalo."

It was little wonder, then, that this was the man whom the air corps high command chose to put the new "pride of the army" through its paces. Upon his recommendations and report much of the future work done with this ship will be founded.

The results of experimentation with the Lockheed XP-38, both on the record flight and in the next few months, will be a determining factor in the rapid improvement of Uncle Sam's air defense and his long strides toward supremacy of the air.

Gas Lines

(Continued from page 23)

read:

"No such model aircraft shall be flown if its weight exceeds seven pounds, or if its wing loading is less than eight ounces per square foot."

CHARLES L. MORRIS,
Commissioner of Aeronautics.

The Southern Connecticut Gas Model Club of 75 Fairmont Avenue, Glenbrook, Conn., is one of the most active gas model clubs in this district. Following is a brief resume of its history:

"Late in 1937, five aerodynamically-minded model enthusiasts got together and formed a club which we called the Noroton Heights Gas Model Club—associating our-

DOUBLE YOUR FLYING

You don't need a calm day to fly the "PROFESSOR"

(3 sizes—see below)



MONOWHEEL landing gear optional on Senior and Super-Senior

NOTE: This picture taken after 73rd flight (all without damage)

SPIN PROOF STABILITY ASSURED BY:

- 1—Wing tips remain level due to new tip ribs which never reach the stalling angle.
- 2—"T" section tail—44% more efficient
- High stabilizer eliminates "blanketing" of rudder and loss of control.

Ideal for Radio-Control or endurance

SUPER-SENIOR \$14.50

Plus 40c Postage
4½" Airwheels \$1.75 add. Span
9 ft. Length 87½". Wing area
10.75 sq. ft. Use any 1/5 to
¾ H.P. Engine.

The high-power small model you've been waiting for has amazing straight-up climb

JUNIOR \$5.95

Plus 25c Postage
3½" Airwheels \$1.50 add. Span
56". Length 44". Wing area
518 sq. in. Use any engine up
to 1/3 H.P.

SENIOR \$6.95

Plus 35c Postage
3½" Airwheels \$1.50 add. Span
6 ft. Length 57". Wing area
684 sq. inches. Use any 1/5 to
1/3 H.P. Engine.

CUSHION-CONSTRUCTION

makes all landings smooth—practically eliminates "crack-up" rebuilding (another reason for doubling your flying).

Balsa-Nose
Cushions
Metal Nose
Impacts

Wing and stabilizer removable
—Free swinging fully protected
from all damage.



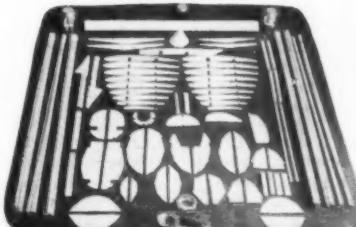
1½" dia. music wire landing gear—bolted to plywood plate and hardwood rails.



All "Professor" Models
have same general lines
and outstanding features.

THESE
ARE
KORFF
K-D
KITS
(KNOCKDOWN)

CUT YOUR BUILDING
TIME IN HALF



Simplified for the
beginner.

A time-saver for
the experienced.

Plus—"Testing Gas Models and Stability Facts"

—OTHER OUTSTANDING FEATURES—

"Warp-Eliminators" in wing and stabilizer—Put on as much dope as you want. "Backbone" construction avoids accurate aligning—Cuts weight—Saves time. Engine mounted on "Breakaways"—Protects engine and ship—Quickly removable; elliptical planform wing—Elliptical section fuselage—Proven most efficient high lift—Low-drag soaring type wing section—Naca 4512—Slow-stalling tip—Naca 6412.

BUY A MODEL DESIGNED BY AN AERONAUTICAL ENGINEER

Gas Models and Supplies Exclusively — Prices and Specifications Subject to Change Without Notice

DEALERS: Write for Attractive Proposition

THE KORFF CO. 607-E. 39th St., Indianapolis, Ind.

Now....

MORE SPEED! MORE POWER!*with the NEW***HURLEMAN CARBURETOR****HURLEMAN
CIRCLE H**

The best available for model motors, this spark plug is the result of exhaustive tests with many kinds of insulating materials and electrode alloys. It really takes a hammering and remains leak-proof indefinitely if not abused. Weight $\frac{1}{4}$ oz. $\frac{3}{8}$ " x 24 thd. Pointed electrodes. Price, 75¢.

Ignition Coils.....\$2.50
Replacement Timers.....\$2.50

Fits all model Brown Engines. Can also be adapted to any motor.

New Model Aristocrat
Motor Complete—
Ready to run.....\$21.50

★ Here is a new carburetor that not only steps up the speed and power of your motor—but does it with smoothness and stability that you never thought possible in a small motor. With Hurleman Carburetors, increased speeds of 1000 to 1500 R.P.M. are common.

In making these carburetors, the Hurleman policy is not "How many can we produce?" but, "How fine can we make them?" Fuel is controlled by a sleeve valve that just can't shake loose. The superior advantages of this type of valve, compared to the fragile, unreliable needle valve in common use, have been repeatedly demonstrated. For most engines and mixtures, the full range of adjustment varies from one complete turn to one and one half turns open. Fits all make motors.

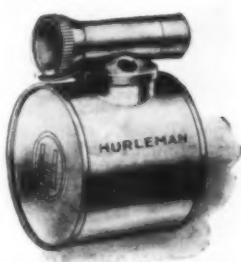
Put more "umph" and "go" in your motor. Ask your dealer to show you the new Hurleman Carburetor today—or write direct to us for immediate delivery. Send check or money order. No C.O.D. orders accepted. All prices F.O.B. Phila., Pa. Descriptive literature on request. Send self-addressed envelope.

HURLEMAN DISTRIBUTING CO.

1438 W. HUNTINGPARK AVE.

PHILADELPHIA, PA.

TWO STYLES



• Hurleman Carburetors are made integral with the tank. Dry weight 9/10 oz. Two tank styles: glass, $\frac{1}{4}$ oz. capacity, \$2.50; metal, $\frac{1}{4}$ oz. capacity, \$3.00.

DEALERS ATTENTION!

Discounts assure you an extra margin of profit on Hurleman products. Write for details.

depends on interest shown by both contestants and sponsors.

"At present our schedule is: First day, Outdoor fuselage and stick events; second day, gas model events. We would like to hear from any or all model builders that would be interested in attending the meet. We are forming a mailing list for rules and entry blanks. No information will be disclosed till the first of April, but we want to have as many builders on our list as possible at that time. If there are any suggestions on our present schedule or possible added events we would like to have them. The contest will be open to the nation. The more interest shown, the higher the stakes."

Maryland

Mr. Leonard Dorsey of 317 South Baylis Street, Baltimore, Maryland, Vice-President of the Baltimore Model Airplane Association, writes us this club received its N.A.A. charter a year ago. Since that time it has progressed until now it has twenty active builders whose activities continue not only through the summer and fall, but even the winter does not stop them from carrying on their work. Two meetings a month are held in the Central Library. All in the neighborhood of Baltimore are invited to join.

Pennsylvania

Mr. William S. Beck, Secretary of the Quaker City Gas Model Association of 209 Righter Street, Philadelphia, Pa., writes:

"The Quaker City Gas Model Association was in the news quite a bit recently when they exhibited gas models and other interesting items at the 38th Annual Automobile Show in Philadelphia.

"A score of gas jobs were suspended in a long line, alongside the Quaker City Association's booth; while in the booth itself photo enlargements and an uncovered gas job was displayed.

"Due to fire underwriter rules, the gas motors were not run, but only explained. These drew many people towards the booth.

"Lots of people became genuinely interested to the extent of planning to attend our meets, or deciding to build gas jobs. Still more joined the club or intend to.

"Charles Gutekunst won first place for the design and workmanship event for gas jobs with his 13 foot Douglass DC-3, and won a Brown "B" motor donated by Junior Motors Corp. His ship attracted widespread attention. Three other awards also were given.

"Spectacular flying (only the harmless variety) was added to the monthly meets which will be continued throughout the winter. Hot coffee will be served free at these meets and perhaps a 'doggie' roast will follow at the end of the day. There are many spectacular stunts on the line such as aerial photography, towing gliders, releasing pick-a-back ships, etc., which will enliven the meets a lot."

MODEL OWNERS**CARS - PLANES - BOATS****Win With****MORE SPEED - POWER BETTER LUBRICATION**

Experience has proved that the basic lubricants in DOXR-2 Speed Fuel are helpful not harmful to model engines. More Speed—Less Friction—Longer Life—Cleaner and Cooler Running.

Run in model engine tests. Blended and developed by experts and World's Record Holders after many tests especially for your model engines. Will run in any 2 cycle model engine.

NOT AN OUTBOARD RACING FUEL

It takes a few minutes to mix—We send you the Formula and $\frac{1}{2}$ pint Can of DOXR-2.

You can purchase the ingredients specified in Formula at local drug store; add Can of Power Blend, make approximately 1 quart of this Sensational Speed Fuel. No extra oil needed.

Write for CAN & FORMULA TODAY



DOXR SALES COMPANY
235 Madison Ave., N. Y. City

N. Y. Users available at Folk's Model Craft Hobby

**America's Most Modern Gas Model
The LANCER**

If you're looking for a distinctive gas model that will stand out from the rest at the next meet in performance as well as appearance, see the new LANCER. It is truly America's most modern gas model.

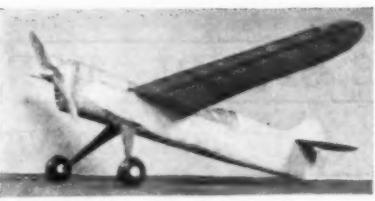
The six foot job, which uses any standard 1/8 to 1/3 HP motor employs an aluminum cowling, upright or inverted mounted fuselage, and stream-lined tail section.

Complete kit for this model includes, an aluminum cowling, cut out ribs and formers, streamlined air wheels, selected strips and sheet, cement, dope, etc.

With colored dopes and a finished prop.

Only...

**\$5.95 p.p.
Plans 50c**



A 45" model is also available for the smaller motor. It employs a simplified monoplane fuselage, which is lighter than ordinary type. Kit is complete with cut out ribs and formers, cement, dope, balsa, sheets and strips, etc.

With colored dopes, a finished prop and air wheels.

**\$1.95 p.p.
\$3.50 p.p.**

**"It climbs like a Rocket"
The THUNDER BIRD 45"**

Competing against over 60 large gas jobs, the "45" established an endurance record that hasn't been equaled yet. Complete kit has cut out ribs and formers, cement, dope, etc., only.

With colored dopes, a finished prop and air wheels.

**\$1.95 p.p.
\$3.50 p.p.**

The Six Foot Thunder Bird is equally complete with cut out ribs and formers, cement, dope, etc., only.

With air wheels, colored dopes, and finished prop.

Plans 25c **\$3.95 p.p.**

**The SPECIAL
1/5 HP. MOTOR**

Each one tested and guaranteed to give lasting satisfaction. Complete with \$9.95 coil, condenser, finish ed 14" prop and oil.

Special combination offer; Deluxe Lancer or Thunder Bird, a 3 oz. dural Flight timer and the SPECIAL MOTOR.....

**ALL FOR
\$15.95
P.P.**

NEW CYCLONE AIRCRAFT CO.
166 Richards St., Dept. A8, Brooklyn, N. Y.

**PERFORMANCE! . . . DAY IN AND DAY OUT
With the New, Improved****PEE-WEE MOTOR**

More Power — More Speed — More Endurance

If you're fed up with disappointments,—slow starting,—mediocre performance,—you owe it to yourself to power your next plane with the new PEE-WEE motor. You'll be delighted with its quick starting, its steady surge of power, its ability to "take it" in the severest tests.



**\$14.50
Postpaid**

The PEE-WEE SPEEDSTER

A fine mate for the famous PEE-WEE Motor. Strong, stable in flight. Easy to build. Wing span 54". Chord 6". Length over-all 28 1/2". Weight ready to fly approx. 24 oz. Kit contains full size three view plan, printed ribs and body formers, selected Bassa strips, Basswood for motor mount, hook-up wire, bamboo paper, 1 pint of dope, cement, wire for landing gear, airwheels, and 10" propeller. **\$3.75** (plus 20¢ postage)

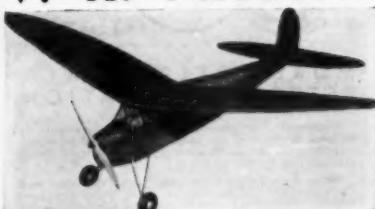
KIT COMPLETE, only...

Dealers write for franchise information on your company stationery.

DALLAIRE MODEL AIRCRAFT CO., 9830 Wyoming, Dept. N-4, Detroit, Mich.



Send for catalog showing our complete line of over fifty models. Everything you need in the way of model supplies. Our prices are right.

V. K. PRESENTS THE MASTER!

DEALERS—Attractive discounts on one kit, etc. Write on letterhead.

THE CHALLENGER

THE CHALLENGER has a 68" wingspread, weighs 3 lbs. complete, and uses any 1/2 or 1/4 H. P. motor.

CHALLENGERS have won numerous contests, and many have been bought by model builders in foreign countries.

The complete kit includes full size detailed drawing, instructions and semi-finished parts, all necessary liquids, ignition equipment, etc. Nothing else to buy except power plant, only.

Complete kit with 3 1/2" rubber tired wheels only \$5.85. Send stamp for our free illustrated leaflet on kits, engines, etc.

V. K. MODEL AIRPLANE & SUPPLIES

(Model airplane engineers since 1927) Williamsburg, N. Y.

THE MASTER has a 6 ft. wingspread and weighs 3 1/2 lbs., complete, ready to fly. THE MASTER is ultra-modern, having an elliptical wing, a high rate of climb wing section, and is stream lined in every detail. The performance is sensational, climbing approx. 800 ft. per min. and soaring on the slightest thermal. Any 1/2 or 1/4 H. P. motor may be used and mounted either upright or inverted as shown.

The complete kit includes a full size easy to read drawing, all strip wood cut to correct size; curved parts, such as bulkheads, etc., clearly printed on sheet balsa; large quantities of cement, clear and colored dope; balloon type wheels; ignition equipment; semi-finished prop; and many more items too numerous to mention here, only.

Kit with 3 1/2" dia. Inflatable airwheels.

\$5.85

5 p.p.

\$6.85

**Air Ways**

(Continued from page 25)

test conducted in the huge auditorium of Cass Technical High School by the municipal Recreation Department with the cooperation of the Board of Education. It was planned especially to stimulate building by the younger boys by giving them competitive opportunities with boys of their own age and experience, according to C. E. Brewer, recreation commissioner.

The contest will be an annual event for which Cooper Brothers, local undertakers, have presented a perpetual trophy to be awarded each year to the winner. Besides the trophy, the winner received a permanent medal. Other prizes were 13 construction kits donated by the Dallaire Model Aircraft Company and 12 additional kits presented by a branch store of the F. W. Woolworth Company. The Recreation Department presented the winner with a dual winder.

This year's winner was James Kahremannia, Pattengill Recreation Aircraft Club, whose plane made four minutes, three and three-fifths seconds, to annex the trophy, the medal and the winder. The youngest contestant was ten-year-old James Miller of the Beard Recreation Aircraft Club whose plane placed fourteenth. This was considered quite a feat for James in view of the short time in which he has been building models.

Art Vhay, who is in charge of the Recreation Aircraft Division of the Department of Recreation, was director of the meet, and he feels that the contest accomplished the object for which it was inaugurated. "The boys' first taste of success with their simple models will undoubtedly carry them into more serious consideration of model building," said Vhay, "In many former unlimited contests, the discouragement of the younger fellow sometimes resulted in their giving up the activity entirely."

The contest in which the beginner is competing with fellows of his own age and experience should be on the program of every aircraft club, in Vhay's opinion.

Burlington

We hear from the "Y" Model Airplane Club of Burlington, Vermont:

"Since our last club news we have held three contests. At present we fly our indoor models in the state armory here in Burlington, but in the near future we will have access to the Memorial Auditorium which has a much higher ceiling."

"Competition is keen in the flying events (Class A R.O.G. semi-flying scale, B tractor, and class "B" fuselage model) and Harold M. Stone, president of the Y Model Airplane Club, has to work hard to keep ahead of fellow competitors. At present Stone holds the State of Vermont records in the Class A R.O.G. of 3:25.6 min. and the indoor flying scale record of 2:14 min. These two records far surpass all of the former official and unofficial records."

"The S-T Model Laboratory, a model airplane company that deals in contest supplies, has done much to further model aviation in this state. Through its work remarkable progress has been made in building and designing of model airplanes. The founders of this company are at present designing the scales for a slow-speed

model airplane wind tunnel.

"Harold M. Stone and a fellow club member, Herb Townsend, will represent their club and Vermont in the New England Model Airplane Meet.

"Vermont can rest assured that their State Champion will do his best to represent his state. He intends to specialize in the indoor events. This is due to the fact that Stone has had considerable experience with all types of indoor contest models."

Jacksonville

We hear from the Model Airplane Club of Jacksonville, Florida:

"Three successful assaults were made on national model airplane marks at a meet staged January 29, at Paxton Field, Jacksonville, Florida. The meet was sponsored by the Jacksonville Model Airplane Club, an affiliate of the Department of Public Recreation. Charles Richberg of 5 Milton Street, St. Augustine, raised the Junior gas power record to 1 minute, 40.1 seconds in a record attempt; after placing third in the Junior event. He also set a new record for Class D Junior stick models, with a flight of 1 minute, 24.1 seconds. Lee Smith of 2645 Rosselle Street, Jacksonville, walked off with the other record; establishing a new mark of 1 minute, 1.1 seconds for Class B gliders in an open event.

"A number of fine performances were recorded in the various events in spite of the murky, gusty, atmospheric conditions. Several models flew out of sight in unofficial test flights.

"All contestants were from Jacksonville, except those listed from St. Augustine and Marietta.

"The meet was run under the direction of Nathan L. Mallison, Jacksonville Contest Director for the N.A.A., who was assisted by C. E. Carley, Charles Johnson and Elmer Wasman as *timers*."

NOTICES

"Test Pilot" Contest

Results of the recent prize essay contest sponsored by MODEL AIRPLANE NEWS and Metro-Goldwyn-Mayer, are now available. Contestants were required to write a 200 to 300 word essay on: "What Do You Think of the Airplane As a Means of National Defense?" The thousands of entries received by MODEL AIRPLANE NEWS and local theatre managers were forwarded to the judges, who selected the following winners:

First prize: The first Free Round Trip award was won by Roger Francis Parkhill, Private Air Corps Technical School, Lowry Field, Denver, Colorado. Second prize: The second Free Round Trip award was won by Walter Johnson Jr., Wayne, Illinois. Third prize: Consisting of the 320 Custom-Built Pilot Radio was won by Quintin E. McCredie, 1317 North Franklin Place, Milwaukee, Wisc. Runners-up in this contest placed as follows: Fourth place, Cadet John O. Ruch, U.S.N.R., Patrol Squadron No. 8, Fleet Air Base, Pearl Harbor, Honolulu—Fifth place, Ralph G. Spears, 224 N. Fourteenth St., LaCrosse, Wisc.—Sixth place, Ralph A. Holmes, 1710 N. Delaware St., Indianapolis, Indiana—Seventh place, Russell Robinson, 3303 S.E. 24th Ave., Portland, Oregon—Eighth place, Wayne Rufus, 1010

"Satisfied Customers Will Always Return And Bring Their Friends With Them."

• JASCO is entering its eighth year of service to the model builders. Its past history is one of continuous growth in the field into which none had dared; manufacturing quality supplies exclusively for contest and record ships. JASCO set for itself specifications which called for *stainless in perfection*. Now these specifications were met in a story in itself. Let it suffice that now—"I am using my friend's catalogue. Please enclose an extra copy with the order."

• From 1932 to 1935 we specialized exclusively in indoor contests. In early 1936 we added the gliders. In early 1938 we added the outdoor and gas supplies. This was done so we had worked out the Color Coding scheme.

• COLOR CODING scheme enables you to tell us exactly what you want. We have the same color coding to exactly what you asked for. Photos show the extra production steps we take to do this.

COLOR CODED BALSA FOR OUTDOOR MODELS

Obtainable in 6 to 12 lbs. ea. ft.
36" Strips

1/16x1/16	2 for 1c	3/16x3/32	...-1c
1/16x1/8	3 for 2c	3/16x1/4	...-2c
1/16x3/16	4 for 3c	3/16x3/4	...-3c
1/16x1/4	...-1c	3/16x1/2	...-2c
1/16x3/8	2 for 2c	1/2x1/4	...-2c
1/16x1/2	3 for 3c	1/2x1/2	...-3c
3/32x3/32	3 for 2c	1/2x3/4	...-2c
3/32x3/16	4 for 3c	1/2x1	...-3c
3/32x3/8	7 for 5c	3/8x3/4	...-6c
3/32x1/2	2 for 2c	1/2x1	...-3c
1/8x3/8	2 for 2c	1/2x3/8	...-3c
1/8x1/2	3 for 3c	1/2x1/2	...-3c

COLOR CODED BALSA FOR GAS MODELS

Obtainable in 11 lbs. and over Cu. Ft.

3/32x3/32	2c	3/16x1	...-9c
3/32x3/16	3c	3/16x1/2	...-12c
1/16x1/2	5c	3/16x1/4	...-12c
1/16x1/4	7c	3/16x1/8	...-12c
1/16x1/8	5c	5/16	12c
1/16x1/16	8c	1/2x1/4	12c
1/16x1/2	10c	1/2x1/2	12c
1/16x1/4	12c	1/2x3/4	12c
1/16x1/8	14c	1/2x1	12c
1/16x1/16	16c	1/2x1/2	12c
1/16x1/2	18c	1/2x3/8	16c

COLOR CODED BALSA FOR GAS MODELS

Obtainable in 11 lbs. and over Cu. Ft.

3/32x3/32	2c	3/16x1	...-9c
3/32x3/16	3c	3/16x1/2	...-12c
1/16x1/2	5c	3/16x1/4	...-12c
1/16x1/4	7c	3/16x1/8	...-12c
1/16x1/8	9c	1/2x1/4	12c
1/16x1/16	11c	1/2x1/2	12c
1/16x1/2	13c	1/2x3/4	12c
1/16x1/4	15c	1/2x1	12c
1/16x1/8	17c	1/2x1/2	12c
1/16x1/16	19c	1/2x3/8	16c

RUBBER MODEL PROB BLOCKS 10-13 lbs. Balsa-No Color Code

3/16x3/16x1/2 10c 3/16x3/16x1/4 22c

1/16x3/16x1/2 12c 1/16x3/16x1/4 25c

1/16x1/2x1/2 14c Special for Fold-

1/16x1/2x1/4 16c

1/16x1/2x1/8 18c 10/16x4x2 1/2 15c

SPECIAL BROWN CONTEST RUBBER

1/16x1/10c Skin60c

3/16x1/30" 10c Skin90c

1/16x1/30" 10c Skin81.10

JASCO Lubricant—2 oz. apout can 25c

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Wing Sections Fuselages

1/16x1/16x1/2 1c

1/16x1/16x1/4 1c

1/16x1/16x1/8 1c

1/16x1/16x1/16 1c

1/16x1/16x1/32 1c

1/16x1/16x1/64 1c

1/16x1/16x1/128 1c

1/16x1/16x1/256 1c

1/16x1/16x1/512 1c

1/16x1/16x1/1024 1c

1/16x1/16x1/2048 1c

1/16x1/16x1/4096 1c

1/16x1/16x1/8192 1c

1/16x1/16x1/16384 1c

1/16x1/16x1/32768 1c

1/16x1/16x1/65536 1c

1/16x1/16x1/131072 1c

1/16x1/16x1/262144 1c

1/16x1/16x1/524288 1c

1/16x1/16x1/1048576 1c

1/16x1/16x1/2097152 1c

1/16x1/16x1/4194304 1c

1/16x1/16x1/8388608 1c

1/16x1/16x1/16777216 1c

1/16x1/16x1/33554432 1c

1/16x1/16x1/67108864 1c

1/16x1/16x1/134217728 1c

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1/16x1/16x1/4294967296 1c

1/16x1/16x1/8589934592 1c

1/16x1/16x1/17179869184 1c

1/16x1/16x1/34359738368 1c

1/16x1/16x1/68719476736 1c

1/16x1/16x1/137438953472 1c

1/16x1/16x1/274877856944 1c

1/16x1/16x1/549755713888 1c

1/16x1/16x1/1099511427776 1c

1/16x1/16x1/2199022855552 1c

1/16x1/16x1/4398045711104 1c

1/16x1/16x1/8796091422208 1c

1/16x1/16x1/1759218284416 1c

1/16x1/16x1/3518436568832 1c

1/16x1/16x1/7036873137664 1c

1/16x1/16x1/14073746275328 1c

1/16x1/16x1/28147492550656 1c

1/16x1/16x1/56294985101312 1c

1/16x1/16x1/11258997020264 1c

1/16x1/16x1/22517994040528 1c

1/16x1/16x1/45035988081056 1c

1/16x1/16x1/90071976162112 1c

1/16x1/16x1/180143952324224 1c

1/16x1/16x1/360287904648448 1c

1/16x1/16x1/720575809296896 1c

1/16x1/16x1/1441151618593792 1c

1/16x1/16x1/2882303237187584 1c

1/16x1/16x1/5764606474375168 1c

1/16x1/16x1/1152921298750336 1c

1/16x1/16x1/2305842597500672 1c

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1/16x1/16x1/9223370390002688 1c

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1/16x1/16x1/236118282240068128 1c

1/16x1/16x1/472236564480136256 1c

1/16x1/16x1/944473128960272512 1c

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1/16x1/16x1/15474247746041280019664 1c

1/16x1/16x1/30948495592082560039328 1c

1/16x1/16x1/61896991184165120078656 1c

1/16x1/16x1/12379398236833024015312 1c

1/16x1/16x1/24758796473666048030624 1c

1/16x1/16x1/49517592947332096061248 1c

1/16x1/16x1/99035185894664192012496 1c

1/16x1/16x1/19807037178932838424992 1c

1/16x1/16x1/39614074257865676849984 1c

1/16x1/16x1/79228148515731353699768 1c

1/16x1/16x1/15845629023156677399536 1c

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1/16x1/16x1/81129551860962342059200 1c

1/16x1/16x1/162459037219384684018400 1c

1/16x1/16x1/324918074438769368036800 1c

1/16x1/16x1/649836148877538736073600 1c

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DEALERS, Clubs, Schools: Send for low, complete wholesale list, including gas model supplies. Save money. Model Airplane Utility, 5307 New Utrecht Ave., Brooklyn, N.Y.

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TABLE of formulas and graphs useful to novice and experienced gas model builders alike. 25¢. Wells, 5734 Merrilewood, Oakland, Calif.

IGNITION timing and spark intensity indicator for model engines. 75¢ postpaid. Dealers wanted. Carlton Engineering, West Carrollton, Ohio.

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GAS Model Props. Any size or pitch write for price. All hand made and perfect balance. Lake Sunapee Model Airplane Co., Lake Sunapee, N.H.

DEALERS, Clubs, Schools, send for latest wholesale list with amazing offers. H & F Model Airplane Company, Bristol Street, Brooklyn, New York.

CANADIAN Gas Modelers—Ohlsson motors bought in Canada cost less by reducing duty. 3¢ stamp brings prices on motors, gas and Wakefield models. Logan Model Aircraft, 818 Windsor Ave., Windsor, Ontario.

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71-83 Beaver St.

goes on the air, via short wave at 6.04 Mc., every Friday at 8:30 P.M. EST. The first broadcast was January 20th. Those who would like to follow a very interesting and instructive broadcast should not fail to tune in.

Correction

Mr. Ben L. Davis wishes us to correct our previously published statement saying he is Publicity Chairman for the Linden Aero Club of New Jersey. The Linden Aero Club with which he is affiliated with is located at 798 Miller Avenue, Brooklyn, N.Y.

It appears that MODEL AIRPLANE NEWS has made a misstatement. In an article by Wilbur Tyler in a past issue, it is claimed that Tyler set a new Canadian indoor stick model record. However, we now have a letter from Edward S. Booth, who is the national Secretary of the Model Aircraft League of Canada, Journal Building, Ottawa, Canada. He writes:

"Such is not the case, as the actual holder of the record is Thomas G. Harris of Toronto, whose time of 20.37 established in the 1937 U.S. Nationals at Detroit was accepted some time before Tyler made his flight at Toronto."

Harris considers that the erroneous statement which you published has done him an injustice, and rightly so, we feel, because a magazine of the standing of MODEL AIRPLANE NEWS should be aware that it would be impossible for other than a Canadian to hold a Canadian record. For your information, the F.A.I. some time ago made a ruling, which in turn was adopted by the N.A.A., that a record shall be credited to the country in which the person who sets it resides, regardless of where the record is made.

"It is true that Tyler's flight is the longest flight in its event ever made in Canada. However, in fairness to Harris we would ask you kindly to publish a statement in your next issue giving the true facts as given in paragraph two of this letter."

One of the members of the Wakefield team, George DeLaMater of 5 Reynolds Avenue, Oneonta, New York, tells us that he had a rather unique experience recently. He flew an indoor model out-of-sight. Being acquainted with a comparatively low ceiling of the usual armory and other indoor flying "fields," we imagine that the flight was made out-of-doors. Believe it or not, the model was covered with microfilm and was a stick model with thirty inches of wing area, weighing .03 ounce. George says he built it in three hours, including the propeller. The model flew fine though the wing covering was broken and the rib was cracked.

Correspondence

Miss Marion Rathbun of 20 North Chestnut Street, Aurora, Illinois, would like to get in touch with other young women who are interested in rubber powered models. At present she is specializing in flying scale and solid scale models, though she expects to construct contest and Wakefield types later. Miss Rathbun belongs to the Aurora Junior Chapter of the N.A.A.

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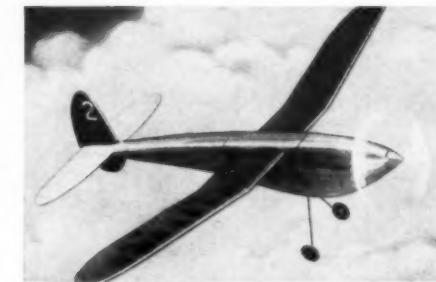
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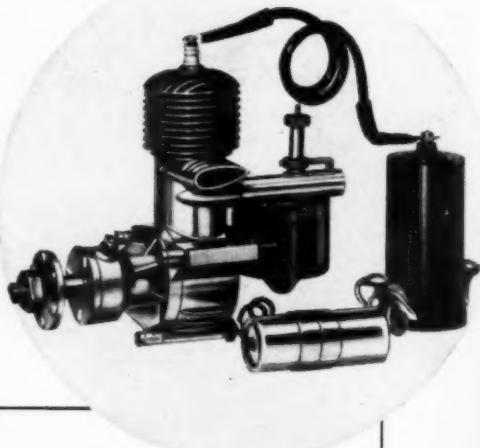
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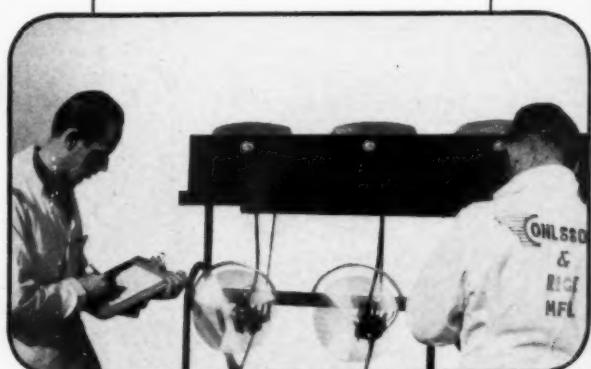
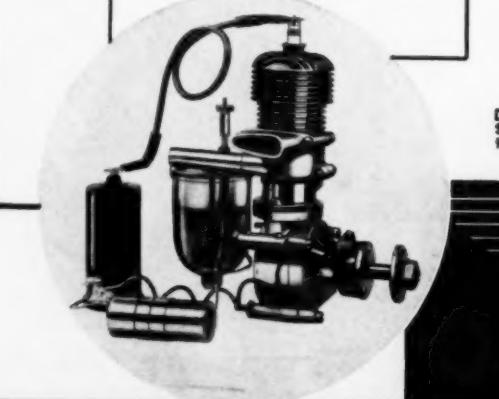
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